



Customer Journey Mapping

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Definition list

Customer journey mapping [CJM]

Customer Journey Mapping is a tool to obtain micro-level data about the interactions between the customer and the provider and the experiences the customer takes along its journey (Følstad & Kvale, 2018).

Activities

Activities are parts of the journey with a specific purpose. These activities start with a verb.

Touchpoints

Touchpoints are moments within the activity where the customer interacts with the service provider through an exchange of information. These touchpoints could influence the participant's experience and create opportunities for other parties to improve the travel experience.

Dimensions

Dimensions are aspects of the touchpoints that might influence the participant's experience during the activity, such as the availability of the information, perceived safety, availability of seating, and the travel time of a transport mode.

Before journey

Quantitative Intake Interview at the start of the CJM. This interview helps to build a consumer profile of the participant and link the CJM results to the survey results of task 1.2

During the journey

The “during the journey” consists out of two parts. First, the participant is observed while planning the trip, and second, the observation and scoring of the actual performance of the trip. If the interview took place with the “COVID-19 proof method, this was an interview about a past experience.

After the journey

The “after the journey” is an interview about the trip “during the journey” that goes into the reasoning behind the actions and scores and the opportunities for improvement.





Executive summary

To investigate the experience of vulnerable-to-exclusion groups who make a journey involving a digital aspect, the Customer Journey Mapping [CJM] methodology was used. With the outcome of this research, the DIGNITY pilot regions have qualitative and quantitative in-depth knowledge of the experience and feelings for a specific target group during a specific journey. The outcomes will help them develop strategies to increase the overall experience of the journey for vulnerable to exclusion groups.

In November 2020, this CJM method was developed and distributed among the pilot regions. CJM is a method derived from marketing and service design to gain insight into the user perspective when making use of a service. Due to COVID-19, it was irresponsible to partake in observations in real transport, especially with vulnerable-to-exclusion people like the elderly. Therefore, the method was adjusted to an online approach (by telephone or videocall) to make it possible to execute this part of the research during the COVID-19 pandemic.

Participants were asked to describe a journey based upon a past experience. During the after journey, an interview followed to understand the motivations of those scores and find challenges and barriers on a micro-level. The interviews are recorded, transcribed, analysed, and labelled to describe their stories structured. The results are limited by the small sample size what makes the reliability and, therefore, validity low, meaning that we can't generalise on a population level. This was also not the aim of the study; the aim was to collect micro-level data about journeys of vulnerable to exclusion groups. Within the limitations, the results provide rich qualitative data expressing how vulnerable to exclusion people from across the population experience transport journeys. Based upon 36 interviews and 246 pages of transcripts, the following main outcomes are:

The participants, including the elderly did not have trouble operating ticketing machines, transport cards and check-in equipment. This does not mean that elderly participants don't have any problems involving digital capabilities. Often, they are insecure about their digital abilities; if they find info, the elderly participants often doubt they found the correct info due to their insecurities. While travelling, they are often using printed travel directions, making them prone to schedule changes. A sufficient social network has proven to be crucial for this group. If they need help, they ask family members, but they are afraid to burden them. If they ask for help during the journey, it's often from people, not from services. The dial a bus in Flanders is an exception to this. They have excellent service for people with low digital capabilities. A facility aspect of travelling that was often mentioned was the need for restroom facilities and shelter from harsh weather.





The second biggest group in this sample are participants with low income. These participants tend to have high digital capabilities but often only operate a smartphone because they cannot also afford a computer, or it is a very old one. This group experiences financial stress from travelling. They check prices beforehand, only travel if necessary, rely on discount and prefer to pay with cash to keep track of their budget.

Participants in wheelchairs often have good digital capabilities because they depend on it to get around safely. Before their journey, they do extensive planning. Reliability is extremely important, as is good infrastructure. This is still a problem in most cities. If they have to travel to new locations, they rather not do this alone but often have to. Due to the difficulty of using public transport, one woman felt like a second class citizen and a burden to society.

For participants who are blind or have bad eyesight, screen readers are incredibly important. Unfortunately, screen readers are not always compatible with transport apps and websites. Bigger fonts also help them, especially on signs and information boards. Because of these difficulties, participants reported travelling less and avoiding travelling to new locations without family members.

All participants who perceive safety as very limiting are women. Out of the 72% of the participants who are female, 69% feels limited due to safety. Half of them (35%) even feels very limited due to safety. To cope with this feeling of unsafety, they employed tactics like driving, travelling in groups, leaving early, and walking through streets with good lighting. If they feel unsafe, they rather drive, but especially low-income women can often not afford this making it also a social-economic problem.

In total 36 participants participated: 8 from Tilburg, 7 from Flanders, 11 from Ancona, and 10 from Barcelona. The sample size is thus small, and the characteristics of this sample are unlikely to represent the distribution of people in the pilots as a whole. This makes this study's reliability and, therefore, validity low, meaning that we can't generalize on a population level. This was also not the aim of the study; the aim was to collect micro-level data about journeys of vulnerable to exclusion groups. This is very labour intensive. Therefore, we agreed on a small sample that could be collected within the available resources. Within the limitations, the results provide rich qualitative data expressing how a range of different vulnerable to exclusion people from across the population experience transport journeys.





Document History

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1. Introduction

1.1. Project summary

The overarching goal of DIGNITY is to foster a sustainable, integrated, and user-friendly digital travel eco-system that improves accessibility and social inclusion, along with the travel experience and daily life of all citizens. The project delves into the digital transport eco-system to grasp the full range of factors that might lead to disparities in the uptake of digitalized mobility solutions by different user groups in Europe. Analysing the digital transition from both a user and a provider's perspective, DIGNITY looks at the challenges brought about by digitalization. This goal will inform the design, testing and validation of the DIGNITY approach, a novel concept that seeks to become the 'ABCs for a digital inclusive travel system'. The DIGNITY approach combines proven inclusive design methodologies with the principles of foresight analysis to examine how a structured involvement of all actors - local institutions, market players, interest groups and end-users - can help bridge the digital gap by co-creating more inclusive mobility solutions and by formulating user-centred policy frameworks.

The idea is to support public and private mobility providers in conceiving mainstream digital products or services that are accessible to and usable by as many people as possible, regardless of their income, location, social or health situation, or age; and to help policymakers formulate long-term strategies that promote innovation in transport while responding to global social, demographic, and economic changes, including the challenges of poverty and migration.

By focusing on and involving end-users throughout designing policies, products, or services, it is possible to reduce social exclusion while boosting new business models and social innovation. DIGNITY aims to achieve an innovative decision support tool that can help local and regional decision-makers formulate digitally inclusive policies and strategies and digital providers to design more inclusive products and services.

1.2. Work package structure

The DIGNITY project consists out of six work packages. Work package 1 focuses on understanding the digital gap in general. With this knowledge, work package 2 builds the DIGNITY approach. In work package 3, methodologies and approaches will be implemented in the pilot regions.

The pilot regions in DIGNITY are:

- Tilburg, The Netherlands





- Flanders, Belgium
- Ancona, Italy
- Barcelona, Spain

Work package 3 consists of 5 tasks. The first task, task 3.1, is about framing the digital gap in the pilot region. In this task, three methods will be used to frame the digital gap in the local situation of the four pilot regions in DIGNTIY.

1. Desk research; to gather the information for the digital gap self-assessment,
2. Customer journey mapping [CJM]; to get insight into the experience of daily activities and trips of vulnerable-to-exclusion groups,
3. Workshop with vulnerable-to-exclusion groups; to discuss the outcome of the customer journey mapping.

This document is part of the second method described in task 3.1 and can be found in the project plan as subtask 3.1.2 customer journey mapping.

1.3. Objective of this report

This report is the result of *Work Package 3 Pilot Demonstrations, task 3.1 Framing the digital gap in the pilot cities and regions, subtask 3.1.2 customer journey mapping*, as described in the project proposal of the DIGNITY project (DIGNITY, 2019), that took place from January 2021 to March 2021. It is the conclusion to getting insights into the daily trips of vulnerable to exclusion groups through CJM and examining their level of vulnerability. This technique created an overview of considerations and choices that users make in their activities and trips. It also shows the difficulties and obstacles for users and the opportunities for policy and mobility products and services. This analysis resulted in the Inclusive Mobility Framework, showcasing challenges and solutions caused by different types of mobility exclusion.

This research took place in Tilburg, Flanders, Ancona, and Barcelona, collaborating with Breda University of applied sciences (BUAS). The research was led by Nick van Apeldoorn in collaboration with Lisette Hoeke and Jules van Herpen. Local pilot representatives conducted data collection.





1.4. Outline of this report

This report aims to describe the mobility challenges participants faced in the pilot regions during their journey. The introduction gave an overview of the considerations and the goals of this approach. In the second chapter, the theory, methodology, process, and study limitations are described. The Customer Journey Manual (both the regular and the normal version) can be consulted for a full overview of the methodology.

Chapters three to six are about the results of the CJM in each pilot. These chapters contain general information on mobility and the digital gap in the pilot. The challenges, the justification for the target group, and the chosen journey are described. After an impression of the questions at hand, the results of this method are described, analysed, and interpreted. Each chapter starts with a description of the personas of the participant. This concludes in a statistical overview of the participants' characteristics. Hereafter, the journey experience is described step by step, mentioning the process, the encountered challenges, and the participants' solutions. In most cases, the structure of the method was followed, resulting in before- during- and after journey experiences. If this is done correctly, the results combined lead to the Customer Journey Map and a general conclusion per pilot.

All available transcripts and the data set can be found in the attachment to this report.

Suppose you are short on time. Read the general theory and the stories of the pilot of your interest. This will give you an overview of the real-life challenges people face every day that are sometimes obvious but often eye-opening.





2. Methodology

Customer Journey Mapping [CJM] is a tool to gain a deeper understanding of the interactions between the customer and the provider and the steps the customer takes along its journey (Følstad & Kvale, 2018). CJM originated from the field of marketing (Singer, 2015) but is also used in a broader context like services and design (Rosenbaum, Otalora, & Ramirez, 2017) to obtain micro-level data based on past experiences. COVID-19 CJM, which was used within DIGNITY, combines two qualitative research methods. Namely, executing a small survey and conducting an in-depth interview in which the participant is asked how they experience certain steps of the journey, what score they would give this step, why they give this score, and what would need to improve their experience.

The application of CJM in mobility, especially inclusive mobility research, proved to be limited after an extensive literature review. No existing method met the aims expressed within DIGNITY, leading to the development of a method suited to inclusive mobility research. To explain what CJM is and how this led to the development of our CJM method, this chapter will first describe the general approach of CJM. This chapter will clarify the general approach of CJM, understand what kind of data it collects, and in what context it can be used.

1.1 Customer Journey Mapping in literature

According to Følstad & Kvale, (2018), there is no established coherent approach for CJM. Attempts to align approaches have been made to create a consistent method to compare maps on a scientifically sound basis (Hong, Han, Chun, & Hong, 2016). It was scoped if it was possible to adjust the method of Hong, Han, Chun, & Hong, (2016) to the context of mobility. Their method did not fit the aim and capabilities within DIGNITY, and their method proved to be beyond the scope of the small-scale approach intended in this research. The inclusive Design Toolkit of the University of Cambridge (w.d.) does contain a step “Describe User Journey”. This method can be used for a step-by-step observation and description of the interaction between a user and a product. This was more in line with the aims of this study but did not yet include the mobility aspect.

Therefore, the method described in this manual is an adjusted interpretation of the more traditional conceptual theory for Customer Journey Mapping as described by Rosenbaum, Otalora, & Ramirez (2017) and the Describe User Journey from the University of Cambridge (University of Cambridge, w.d.)



When mapping a customer journey, the map itself consists of two axes. The horizontal axis indicates the activities, events, and interactions that occur in time (Crosier & Handford, 2012). These moments are referred to as 'activities'. Rosenbaum, Otalora, & Ramirez (2017) describe activities as moments in which the user is made to think of or makes preparations related to the service, during and after the utilization. Examples of these activities in the context of mobility would be: going to a bus stop, finding out which bus to take, check-in or buy a ticket, find a seat in the bus, keep an eye out for the bus stop, check out and get out of the bus. These touchpoints are then combined with the 'vertical information axis' that contains the experience and feeling of a user/ customer/ target group during the activity (Crosier & Handford, 2012). When combining touchpoints in time on the horizon axis with the feelings and experiences on the vertical axis, a graph like in Figure 1 can be made. This graph shows what activities someone undertakes for their journey and how this affects their feelings and emotions.

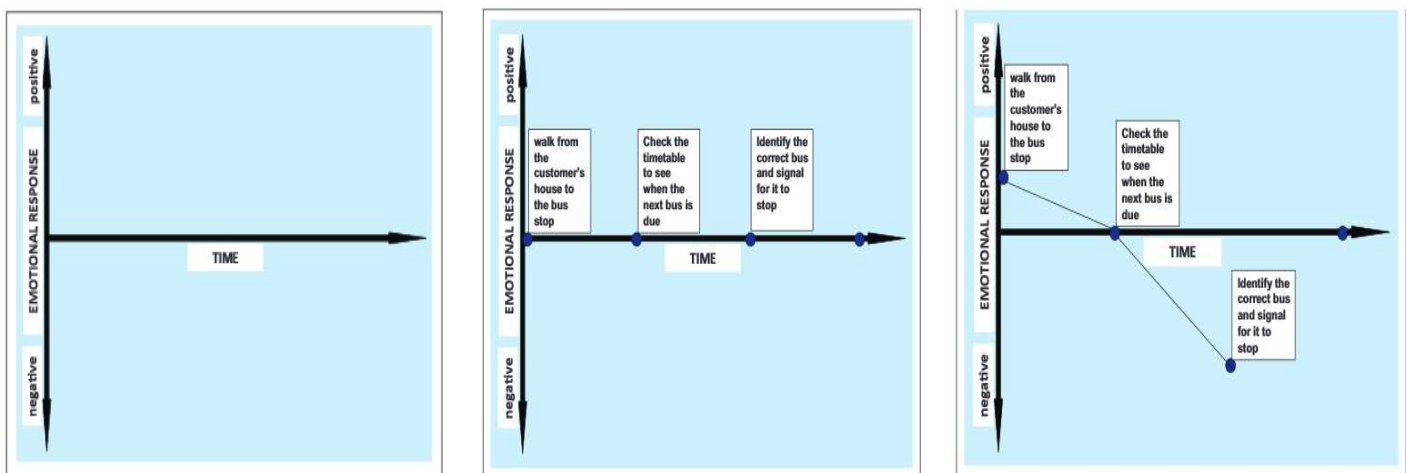


Figure 1 Example of the two parts that make up a Customer Journey Map (Crosier and Handford, 2012)

1.2 Customer Journey Mapping as a tool to gain micro-scale qualitative data

The mobility ecosystem can be divided into three scales: macro, meaning on a national or city-wide (legislative) level; meso, meaning the (mobility) providers situated between (local) government and the users; and micro, directly in the behaviour or sphere of the user. The purpose of this approach is to gain an intricate and actionable understanding of the degree of mobility challenges in the selected target groups. Much research into mobility and excluded groups already exist. However, it is often focused on quantitative



data on a macro level (Keyson, et.al, 2003; Uteng, 2006). This approach is shaped to provide more micro-level qualitative data to identify specific problems of different target groups. Combining the user perspective and the expert's knowledge provides a good start towards creating effective solutions to decrease mobility exclusion. Furthermore, due to the general lack of research into this topic on this level of depth (Jeekel, 2014), further research greatly adds to the current knowledge.

Employing CJM in this sense can give valuable insights and answers to specific situations, groups, or questions. It should, however, be noted that it is very intensive, which leads to smaller sample sizes and a narrower scope of the project. CJM should then be employed not as a singular approach but as a supplement to a larger approach with a greater scope, such as a widely cast survey.

DIGNITY used a similar approach, with 36 participants, divided into three steps: before the journey, during the journey, and after the journey. In the "before journey", customer profiles are developed by a small survey. After that, they need to figure out how to get to a predefined location. During the journey, the participant is observed while travelling and asked to describe their level of emotion at certain activities. Unfortunately, it was not able to do this during the pandemic. Therefore, participants were asked to describe a journey based upon a past experience. During the after journey, an interview follows to understand the motivations of those scores and find practical challenges and barriers on a micro level based on real situations. Depending on the pilot region's local situation, the target group and type of journey will differ, but the underlying principles remain the same. The interviews are recorded, transcribed, analysed, and labelled to describe their stories structured. In autumn 2021, this data will be validated in focus groups with the vulnerable-to-exclusion target groups in each DIGNITY pilot region, which will result in Deliverable 3.1.

1.3 Implementation process and limitations

In September 2020, the CJM methodology was developed. The method was finished by the end of September. Unfortunately, COVID-19 cases were rising again across Europe, which resulted in an impossibility to execute the research as planned. For example, it would be irresponsible to partake in public transport journeys with the elderly during the pandemic. Therefore, the CJM COVID-19 proof manual was finished in October 2020 and simultaneously tested in Tilburg. This manual was finished in November 2020. After including the lessons learned from Tilburg in the manual, it was distributed amongst the pilots. In December 2020, the pilots got online training in executing the methodology. Tilburg was already finished at that stage. Ancona and Barcelona delivered their data in





March and April and Flanders, due to a complete change in staff, delivered their data in June of 2021.

In total, 36 participants participated: 8 from Tilburg, 7 from Flanders, 11 from Ancona, and 10 from Barcelona. The sample size is thus small, and the characteristics of this sample are unlikely to represent the distribution of people in the pilots as a whole. This makes the reliability and therefore validity of this study low, meaning that we can't generalize on a population level. This was also not the aim of the study; the aim was to collect micro-level data about journeys of vulnerable to exclusion groups. This is very labour intensive. Therefore, we agreed on a small sample that could be collected within the available resources.

Because the sample size is small, we took extra caution when analysing the data. Luckily, the non-response on the quantitative survey was very low. Most interviews were recorded, literally transcribed in the local language and then translated to English by a native speaker in the local language. All available transcripts can be found in Customer Journey Mapping, Appendix. One interview from Flanders was recorded but inaudible, making transcription impossible. One interview from Tilburg had a corrupted recording forcing us to use the interview notes that the interviewer made. The information of this specific interview, however, was barely used. Unfortunately, Ancona had no recordings and thus no interview transcripts, making it impossible to verify the information and analyse the transcripts from Ancona, making that information not verifiable and thus less reliable. Within the limitations, we collected useful information to help us understand the challenges for vulnerable to exclusion groups when travelling.



2. Tilburg Case

2.1 General information on mobility and the digital gap in Tilburg

Tilburg focused on two target groups for their Customer Journey Mapping. Namely: Elderly and low-income groups. The participants of this group are coded as TP# E/I, in which TP stands for participant, '#' represents the unique number of the individual participant, and 'E' or 'I' for the group 'Elderly' or 'Low Income'. In case of direct citation, Ap[x] is added in which 'A' stands for Appendix, 'p' for page, and 'x' the page number.

Tilburg investigated a bus trip for the CJM. They found participants through affiliated organizations like Contour the Twern and personal networks.

2.2 Participants

Table 1 statistical overview of participants in Tilburg (n=9)

Digital capabilities	Every day/Once a week	Once a month/ more than 3 months ago	Never	Total
Computer	0,63	0,25	0,13	1,00
Smartphone	0,88	0,13	0,00	1,00
Internet	1,00	0,00	0,00	1,00
	Average	Std.s	Min	Max
Confidence level	7,6	1,8	6	10
Transport	Every day/Once a week	Once a month/ more than 3 months ago	Never	Total
Bus	0,00	1,00	0,00	1,00
Train	0,13	0,88	0,00	1,00
Bike	0,88	0,13	0,00	1,00
Services	Every day/Once a week	Once a month/ more than 3 months ago	Never	Total
Sharing services	0,08	0,17	0,75	1,00
Digital taxi services	0,00	0,38	0,63	1,00

Limitations	Not at all limited	Slightly limited	Very limited	
Financial	0,50	0,25	0,25	1,00
Availability	0,38	0,50	0,13	1,00
Facilities	0,43	0,57	0,00	1,00
Safety	0,63	0,25	0,13	1,00
Disability	0,88	0,00	0,13	1,00
Digital requirements	0,50	0,13	0,38	1,00
Digital skills	0,63	0,13	0,25	1,00
Demographics	Average	Std.s	Min	Max
Age	58,6	18,1	35	83
Gender	Male	Female	Total	
	0,50	0,50	1,00	

The statistical information from this sample is unlikely to represent the distribution of people in Tilburg as a whole, due to the small sample size. This table is provided purely as a summary of this particular sample. Since this study aims to collect micro data, a detailed description of each participant is given below.

Participant TP1E is a 70-year-old man from Tilburg. Despite his age, TP1E states that he is an active user of the digital environment. He notes that he uses the computer, his smartphone, and the internet daily. However, he does not feel fully confident to plan a public transport trip to an unfamiliar location, granting it 6/10. He hardly ever travels by train, takes the bus about once a month, and cycles daily like a true Dutch person. He doesn't use other forms of transport services like Uber or other sharing facilities. Regarding subjective limitations in his regular travel behaviour, he states that he feels very little to no limitations on the exception that he feels 'very limited' regarding planning a trip that requires digital skills. This might show that frequent digital usage does not solve the digital exclusion of mobility services.

The oldest of participants, TP2E is an 83-year-old man from Tilburg. His age does not prohibit him from using the existing digital facilities as he too uses his computer, smartphone, and internet daily. The fact that he rates his confidence to plan a trip to an unknown location high (8) might have something to do with his monthly usage of the train. The bus, he says, he hardly ever uses, which contrasts with his usage of the bicycle as a means of transport, which he does daily. Personally, he feels slightly limited in his regular travel by costs, transport availability and subjective safety. Besides these, only COVID-19 has a notable impact on his willingness to travel.



TP3E, a 67-year-old man, replies assertive (10) to the question of how confident he is in planning a new public transport journey – something which is later explained through his experience in doing exactly this. He does not own a smartphone but uses his computer and the internet daily. Besides the bus (once every three or so months), the train (at least once a month), and the bicycle (daily), he also makes use of the provided bike-sharing options. Regarding subjective limitations, his only noteworthy one is the idea of climate change. He states that he does not want to fly as long as he does not have to and thinks about this topic with transport on a day-to-day basis.

The last elderly participant is a 72-year-old man who is confident in his travel behaviour and digital usage. He owns a smartphone and computer with internet, which he all uses daily. The bus he uses monthly whilst the train weekly and the bicycle daily. This adds to the confidence he expresses regarding planning an unknown trip (9). Like TP3E, TP4E also makes use of bike-sharing facilities. The only way he feels limited in his regular travels is by the availability of infrastructure and by the time of day: between certain hours, he cannot use public transport.

TP5I is a 35-year-old female who has a relatively low income. She does not own a laptop but finds all the information she needs on her phone with the internet that she uses daily. She is very confident that she could plan a trip involving a digital aspect. Technology is not the limiting factor; her wheelchair is. She uses a wheelchair which limits her in her travel. She travelled at least once in the last three months by bus or train. She doesn't cycle. Car sharing is something she does almost weekly, just as other wheelchair compatible sharing services. She is a resourceful woman who can find solutions to her situation, but she still often experiences limitations in her daily life. Due to her disability, she cannot work, which limits her finances to a medium extent. Not all routes are accessible by wheelchair, which is very limiting to her. Luckily safety is not a concern.

TP6I is a 63-year-old woman with a lower income. She uses her laptop and phone with the internet almost every day. This does not equal digital confidence. She gives her ability to plan a trip involving a digital aspect a 6. Travelling is not something she often does. Once every three months she takes the train or bus. Cycling is something she last did more than a year ago. Sharing services she never used. Although money is limiting her, she did not state this because she does not travel often. Availability of services and infrastructure, she perceives as slightly limiting. Safety is very limiting to her, although she did not specify this in the interview. Her digital challenges are more related to the trip itself than the planning of the trip.

TP7I is a 41-year-old female who hardly uses a computer but uses her phone with the internet daily. Just like TP6I and TP8I she gives her confidence in planning a trip a 6. She does not travel often. Around once every three months, she makes a trip by bus and train.





Cycling, however, is something she does almost daily. Just like the other participants, she does not use sharing or digital taxi services. Her biggest limitation is finance. She is also slightly limited by the infrastructure and safety. Like TP6I she is also more limited by the digital aspects of the trip than when planning the trip.

TP8I is a 38-year-old female. Just like the other low-income group, she uses her phone more often than a computer. She rarely uses a laptop but makes daily use of her smartphone with the internet, for which she feels rather neutral (6). She makes use of the train and bus around once every three months. Cycling is something she does daily. Digital taxi and sharing services are options that she never used. Her biggest limitations are finances and availability. She does not feel limited at all by the infrastructure, safety, and physical ability. Planning is harder for her than making the trip.

2.3 Detailed Results Tilburg

Pre-journey

2.3.1 Q1 If you have to make a journey, how comfortable do you feel in general?

Elderly:

Generally, the participants had a positive disposition towards travelling. This was mostly because travelling was not seen as something of great difficulty. Furthermore, since the participants were all retirees, trips were usually taken for leisure reasons, shedding the making of trips in a generally positive light. “I enjoy visiting people and going places, especially because this is something I hardly ever did for work.” (TP3E, Ap25). However, the prospect of not being able to utilize restroom facilities easily was specifically mentioned by TP4E as something which bothered him.

Besides it influencing the motivation to undertake the activity for which the trip would be taken (TP2E), the weather during the planned moment of departure was not seen as an important obstacle. It is noteworthy that the prospect of cold can cause discomfort, especially in winter or in the evenings when proper cover is not provided. Both TP4E and TP1E commented in this direction. TP1E even went as far as to say that it may keep them from using the train altogether. He mentioned this was especially true when waiting on a platform on the way home, waiting for the layover. None of the participants felt that they were less comfortable travelling alone than they were travelling together with others.





2.3.2 Q2 If you have to plan a journey, how comfortable do you feel in planning this trip?

Low-income:

Planning a trip can raise very different feelings per participant. Travelling for TP5I, leaving her house raises a feeling of discomfort, especially when she has to do it alone: "A bit tense. If I had to do it alone, I would be rather anxious as I am so reliant on others" (TP5I, Ap65). TP8I stated that, even though she does her best to confront her fears, travelling can evoke feelings of anxiety, especially since she has been battling depression for some time. Another participant (TP9I, without transcript) said that she depended on her ex-spouse a lot. However, lately, she has been trying to be more independent, and it has been going well. It is not clear if these negative associations correlate with having little income or are also enforced by also being a woman as all low-income participants in Tilburg are. The majority of the participants seem to have a fallback person to help them out. This usually happens to be a relative.

On the question of whether the weather has a notable impact on travel behaviour, mixed answers were given. TP6I, TP7I and TP9I all stated that it did not form a notable obstacle. At the same time, the participants who have a physical (TP5I) and mental (TP8I) disability both were reluctant to travel outside in bad weather. TP5I, who relies on a wheelchair to get around, stated that she would experience a lot of stress if she had to travel on her own. This was emphasized during times of rain: "Yes, if it rains, travelling becomes even more difficult because I lose grip during breaking." (TP5I, Ap65). All participants can travel alone, but some like to travel with others depending on the motive and, for TP5I specifically, the necessary comfort.

2.3.3 Q3 If you have to plan a journey to a new location, how do you plan this trip, would you use a public transport card and if yes, how did you become familiar with this?

Elderly:

For the planning of a trip, various digital services were mentioned. TP1E through TP4E all used digital means to plan their trip, varying from Google Maps to the OV9292 app and the NS reisplanner (website and app). Some, like TP3E combined the digital services with analogue means as he did not use his smartphone but rather his computer to plan his trips. He would write the trip's details down on a piece of paper that he would then take with him. TP2E similarly used paper travel guides to find specific routes in combination with the digital service. This shows that even though one might use a website for planning, they do not necessarily feel comfortable relying on their smartphone during the trip. They





rather have a physical piece of paper in their hand telling them where to go. TP4E usually only plans the trains through a trip planner and then uses the information on the destinations website's information section on how to reach it from the station. None of the participants expressed problems or difficulties in trip-planning regard.

TP2E was asked about his usage and experience with the OV transport card. He mentioned that he has had it for a long time and probably obtained the information to get it through the NS service desk.

Low-income:

All participants were aware of the OV-chipcard. However, the perks of having a yellow card (discount) are either not known or simply not cared about for some. Interesting to know is that TP6I owns an OV-chipcard (blue) but prefers to pay for a physical ticket in the bus. In retrospect, though, TP6I leaves the payment process over to other people. As for TP9I (no transcript) that also uses the blue (anonymous) card, was not aware of the perks of having a yellow card. This participant, in particular, has low digital skills in terms of searching in specific what the perks each card has. In fact, this participant had a son who was the one to buy and recommended that she use the card as this became the new payment method.

2.3.4 Q4 How do you find information, and do you pay attention to the costs and efforts required for the trip?

Elderly:

The participants were usually able to find information. However, some difficulties do exist. TP1E mentioned that it was sometimes difficult to find the right route information because a lot of information was being displayed at the same time: "Sometimes three different (bus-, ed.) lines all go to the same place through very different routes. It can feel like an enormous soup and therefore rather difficult to see which one should be taken" (TP1E, Ap6). Participant TP3E indicated that it could be difficult to plan return trips. He does this on forehand and the time and travel details of the trip could change in the meantime.

An interesting finding was that most elderly participants 'downplayed' the problems they experienced by stating that they are old and probably not as accustomed to the digital information provision. As if it is their fault that something went wrong: "It bothers me that the information that I find is not always correct or that I simply can't find it. However, this might also just be me... that I am not able to understand the information... because of my age. If you are younger, this is probably a lot easier." Followed by: "I think the elderly benefit more from public transport than the young people, so that could be a bit easier."





(TP1E, Ap7). A similar point was made by TP3E. Whether the information was correct or not, three out of four participants mentioned having difficulty with its provision. As mentioned, TP3E uses pen and paper to plan a trip. Due to not having a smartphone, the participant relied on old information that was written down. If times then changed, this consequently meant that his information was incorrect. Again, the participant mentioned that this could also be because he looked up the information wrong, expressing self-doubt in the process. Another participant, TP4E, expressed that a particular connection often failed, expressing frustration that this connection would be shown as good when he looked it up but bad when he arrived at the station. As a solution, the participant now takes a different route. TP4E and TP2E explicitly stated to be relatively confident in finding exact information, of which TP4E mentioned it is a great improvement over the previously existing system, which was paper booklets.

Participant TP1E through TP4E indicated that they did not pay great attention to the cost during the planning process. All participants also own an elderly transport card, which offers reduced fees when used after 09:00. Most of the participants indicated that they did not pay great attention to the physical difficulty of the trip. TP3E and TP4E mentioned that they did not mind walking for a kilometre, which would suffice for their daily hike. One of them would even choose walking over waiting, saying: "Well, I hate waiting, so if (my destination, ed.) is 15 minutes away and the bus takes 10 minutes to arrive, I am not going to stand and wait for a bus to arrive... I rather walk." (TP4E, Ap49).

Low-income:

Overall, the participants knew how to operate sites or apps to schedule a trip or find out the price. All participants thought that finding information was doable. Even though she understood, one of the participants did note that she could be frustrated by the actions she would sometimes have to take. "When I travel by bus, it is probably due to COVID-19, I have to book a ticket online through my phone. That annoys me... for a bus!" (TP6I, Ap76).

TP6I and TP8I mentioned that they use digital means to plan a trip. For TP5I, planning a trip is a bit more difficult and important. As she is in a wheelchair, knowing what is coming is very important. She, therefore, plans her trips with Valys, a service for travellers who experience disabilities in their mobility.

Generally, all participants look at the costs of their trip, although it can depend on the length of the trip. TP6I said she avoids long trips at the beginning of the month when her paycheck has just come in because she is not sure yet how many other costs she still has to make that month. If the month progresses, she has more clarity of the budget that is





left and the chance of unexpected other costs reduces. She won't need to look at the costs for shorter trips because the costs would be relatively low.

During-journey

2.3.5 Q5: How do you prepare for your trip, feel like you had enough time to prepare, and plan for the first mile?

Elderly:

All participants indicated that they like to be well prepared and prefer not to have too much to carry. Most of the participants also indicated that they are used to travelling and, therefore, are at ease with preparing for a journey. To ensure they would not have to hurry, the participants all mentioned that they like to prepare for their trip long before leaving the door. "A pair of sunglasses or a handkerchief, I make sure I have them ready on the evening before leaving so I don't discover that I have forgotten them during my trip." (TP2E, Ap14). TP4E also expressed that it is a lot easier to take the time to do things rather than be hurried as a pensioner. The participants indicated that they live quite close to the bus stop or station and usually walk or take the bicycle. TP2E stated that he usually walks, unless when travelling with his wife. "When we travel together, we take the car." (TP2E, Ap14). TP4E indicated he might use the bus when the weather is unpleasant if it ran more often than twice an hour; for now, the bus does not; he usually takes the car when the weather is bad. All the participants indicated that preparing for the journey went excellently. One of the participants said that preparing for a journey is so insignificant as to warrant only a completely neutral reaction and refusing to provide a score for the customer journey map (TP4E).

Low-income:

The majority did not fuss about preparing for a trip. Preparations are what can be expected; looking outside to check the weather but not being influenced by it generally; making sure all items that are needed are within hands reach. Only for TP5I, the preparations for a trip are more work as she is wheelchair dependent, so she needs to do a lot more before going outside the house. This takes up a lot of energy: "It certainly takes about 30 minutes to get ready with getting all my stuff and making myself and my wheelchair transport-ready." (TP5I, Ap66).





2.3.6 Q6: How did you experience the first mile, is there sufficient infrastructure, did you feel safe, and any unexpected disruptions in either the route or the mode of transport for the first mile?

Elderly:

All the elderly participants rated the infrastructure they needed as more than adequate, with no complaints. All of the participants indicated that they have no trouble with other traffic on the road, and most feel safe. One of the participants stated that the feeling of safety could be influenced by the time of day, saying, "But when talking about coming home, for example, and if that is late in the evening, I do sometimes find it difficult to walk home. I would then call my wife to come to pick me up. Or a taxi if I have to." (TP2E, Ap15).

This reduced feeling of safety when it is dark also impacts this participant's desire to travel, especially during the colder period of the year. Most of the participants said that they encounter relatively few unforeseen barriers, other than incidental roadwork. They often cause little delay: "Uhm, yes that (disruptions or unforeseen barriers, ed.) does sometimes happen, but only seldomly." (TP4E, Ap53). They also reported that they seldom had any problems when using their designated transport mode for the first mile. When talking about experiencing a flat tire, TP4E addressed the fact that he is "still in the fortunate (health, ed.) circumstances to be able to fix it myself" (TP4E, Ap53), also showing a sense of self-reliance. In this regard, the participants rated the score very high, indicating that this part of the journey is no problem whatsoever.

Low-income & in a wheelchair:

60% of the participants mentioned that there were not any inconveniences in the first mile. For TP5I, who relies on a wheelchair to get around, this question triggered more of a reaction. She noted that she has to stick to specific, familiar routes she knows are smooth enough for her wheelchair. Once "I was launched out of my wheelchair because the front wheels got stuck in a pavement crevice. The electrical support engine made the back-wheels turn, but my front-wheels were stuck..." (TP5I, Ap67). She later mentioned that she needed to go to the hospital as a result.

Moreover, she addresses that she is less tall when sitting in a wheelchair, meaning that crossing the street brings more risks. For herself, this translates to uncertainty and fear: "where are they able to see me, can they spot me?" (TP5I, Ap67).





TP8I said that she usually walks but avoids taking the bus; "I always find people who travel by bus a bit sad. Packed like sardines, stopping so often." (TP8I, Ap88). This mostly culturally based opinion leads to her usually travelling individually, mostly by car.

2.3.7 Q7: How do you experience arriving at the bust stop? Is safety a problem? Is it clean, does it feel easy to navigate?

Elderly:

All the participants said they had little to no trouble finding their way around the outside of the station to the inside. However, something that came up with two of the participants is that a change to what is individually considered normal can cause some difficulty. TP4E noted that it does not always work directly when using a QR-code ticket instead of the regular OV card. Another travelled to a city where he had hardly ever been and encountered a system to which he was not accustomed too. "...they had a very complicated system, I thought, to be able to get an (OV-, ed.) bike with only using my OV-card. Gates and key-locked boxes were then to be opened through some digital action... Someone far away hand-gestured me to explain how to operate it. If that person would have (come up to me and, ed.) just told me, it would have been easier for the both of us." (TP3E, Ap30).

Generally, the participants stated that they perceived the station environment as clean and safe, "...although it, of course, depends what standard you attach to it" (TP2E, Ap16). One participant added that in the evening hours, this was less so, relating to the fact that places like stations always carry some feeling of unsafety (TP2E). Furthermore, the same participant also added that cleanness seemed to decrease as night came closer, relating this to trash cans that might be full while stores might still be open. Amongst all the participants, this section was, however, also rated very highly. They seemed very comfortable and confident with the workings outside of stations, their general safety, and the cleanliness.

Low-income:

Not all participants could answer this question fully as not all participants travelled by public transport very often. The ones who did had no notable comments except one. TP5I had a notable addition. Because of her disability, she fears travelling alone, even avoiding it altogether. This is not always due to personal trial and error; "With the stories, I hear from others; the bus driver who is not willing to help you, or the bus stopping too far away from the pavement... you know, it's simply rather scary." (TP5I, Ap68)





During the conversation, the woman in the wheelchair doubted herself multiple times. Stating that she felt as if she was considered a second-class citizen or “a burden to society” (TP5I, Ap68).

2.3.8 Q8: How do you pay for the journey?

Elderly:

All the participants had an elderly discount public transportation card, allowing them to travel at a reduced fee outside peak hours. This is a regular public transport card with a free elderly discount subscription that you can claim after turning 65. They also responded that they had little to no trouble using them to pay at the bus ticket machines or the station gates. How exactly these worked could have been clearer at the beginning, but in the end, everything was figured out without any problems. However, TP4E mentioned that using printed out tickets is usually difficult with the station gates, as stated in the question above, but usually works out in the end. In general participants use the public transport card but discount tickets often require printed tickets. Finally, all but TP3E indicated that they had enabled automatic charging on their public transport cards to remove a factor of uncertainty from using public transport.

Low-income:

Most of the participants know how to check in with a public transport card. However, due to some not travelling often, they tend to buy a physical ticket. For some, like TP8I, the technological advancements in public transport took some time to get used to. However, it quickly turned to be something that just goes automatically.

2.3.9 Q9: How do you experience the bus stop or train stations, and how easy was it to find information inside?

Elderly:

All the participants said they plan their trip, and therefore only have to look for the correct train and platform once they arrive at the station. Most of the participants indicated that this could be difficult, as most of the information boards have large amounts of information that is not always structured clearly. For example, when searching for a train to a specific destination, it might be unclear as only the end-station is mentioned on the board. TP3E stated that he prefers the large yellow boards, which show the train schedule over the entire day or even week, rather than the short-term information displayed on the electrical boards. TP1E stated that he had some difficulties finding information: “Despite





the digitalization, it is becoming increasingly difficult to see where exactly you have to be and what bus you have to take for example. Even though it all looks very clear, it is sometimes rather difficult to see where one exactly has to be." (TP1E, Ap9).

When not at the station, however, TP3E indicated that difficulties could be encountered. When checking system-related information at home, troubles surrounding the sign-in or having the right information available can be encountered. When asked whether this person then calls the Service Desk, he stated: "Oh no, no. I have very poor experiences with them, I must say. I had the idea that I was hopelessly embarrassing those people with my unclarities." (TP3E, Ap33). This might hint at a fear of being perceived as 'obtrusive', or 'assertive'.

2.3.10 Q10 How do you experience waiting for the bus or train. Are there any amenities you miss?

Elderly:

The participants had varying answers on what they do when they must wait. TP1E said he would wait, while TP2E would 'people-watch and' look at how people behave and react, while TP4E said he hated waiting and would walk around the platform or read a book. With regards to amenities, two of the participants indicated that they very much liked to have a place to sit, more so placed importance on there being a toilet (TP2E, TP4E): "... I do not necessarily need a drink dispenser but being able to sit sheltered and access to a toilet is very important." (TP4E, Ap56). All the participants stated the importance of a place to shelter from the sometimes harsh weather. TP4E expressed a great disliking for waiting but also said that some stations are far preferable to others due to the mentioned factors and amenities.

Low-income:

Besides generally disliking the wait, most participants did not have specific things to say about their waiting experience. Some used the facilities offered and liked when there was a place to shelter from the weather.

2.3.11 Q11: How do you experience boarding the bus or train?

Elderly:

Overall, most of the participants indicated that boarding proved little problem. Now and then, someone might be disrespectful and push or harry others, but these were the





exception. This is somewhat due to many elderly preferring to travel outside peak hours, as both TP3E and TP4E indicated: "I have a discount card so yeah, it must be a very special occasion should I travel before 9 o'clock. So, for me, yes always enough room." (TP3E, Ap37). Most of the fellow travellers would behave perfectly normal. One participant indicated he found boarding to be a "trickier" part of travelling, and always walks with the train as it slows to a halt to board the train quickly (TP2E, Ap18).

Low-income:

In general, there was no issue with stepping in, although some do feel the need to worry whether they have a sufficient balance on their card or that they have their ticket and or card. As mentioned before, however, TP5I, who is wheelchair dependent, does face major difficulties using public transport. Interestingly, this does not limit itself to not being able to board or not being helped. When using the bus and facing a fellow passenger who is not willing to give up their place, it creates a very awkward situation in which the participant feels embarrassed: "I remember once when I used the bus. Someone 'healthy' was sitting in the designated place for disabled people. He would not get up, so the driver interfered and said that the bus would not continue if he did not give up his place. So, embarrassing." (TP5I, Ap71).

2.3.12 Q12: How do you experience the journey?

Elderly:

All the participants agreed that the information provided within the vehicles was good. Most of the participants also agreed that the information provided on the digital screens was commendable, especially the information it showed regarding transfers: "What I particularly like is that you can see the train in advance, let me say, 10 minutes away or sometimes even earlier. That this train then arrives at platform 3, and that trains XY and Z then offer transfer possibilities, which then leave on that platform so and so. I think that is a huge improvement." (TP3E, Ap36). TP3E also commended the conductor for providing verbal information on the potential transfers, while one disapproved of the clutter surrounding the useful information in the conductors' message. Just as with the signs in the train station, they like to receive information but find it difficult when it is a lot. TP2E, TP3E and TP4E agreed that the quality of the audio systems on the trains could be better.

Usually, enough seating is available, but due to the nature of the participants discount transport cards, they travel outside rush hours. Moreover: "When I travel far, I usually travel first class." (TP2E, Ap19). The train's interior is usually tidy, all participants agree, and it seems the trains are cleaned more often in recent years. TP2E and TP4E agree that the





trains are usually less tidy during the evenings when passengers might be more likely to leave things around, or bins might be full. All the participants have little interest in communicating with other passengers and prefer to relax or read. They also agree that people who create loud noise, especially music, are very bothersome. TP3E did say that whenever something would annoy him, he would simply solve the problem by taking a seat elsewhere rather than bothering others.

Low-income:

Overall, there was no complaint about it. The information provided was sufficient. The majority did not have an issue with the bus ride itself. However, two participants disagreed with that. One simply answered by saying she hated waiting in general and riding the bus is equal to waiting. The other participant mentioned she was claustrophobic (TP9I).

2.3.13 Q13: How do you experience transfers?

Elderly:

Generally, none of the participants experiences any problems regarding transfers. TP3E emphasized that this is probably because he travels often and has seen many station areas. Having experienced the fact that it usually works out fine provides confidence and, therefore, comfort. Three participants said that they had planned the trip in advance and therefore knew what to do. It was also mentioned that the information provided regarding transfers within the train was very useful (see previous answer relating to information provision). Usually, the time spent waiting for transfers was acceptable for all the participants, though one of them stressed that the gap between the trains grows as the day comes to an end. This can make travelling during the evenings difficult.

Low-Income:

Transfers usually did not present too many issues. TP8I stated that she would walk up to the bus driver or someone from the NS when a problem arose—indicating that they do not seem to find it difficult to ask for help if it is due to an external cause and it does not put a public spotlight on them. Regarding the waiting-time, TP5I noted that she believes that the system has changed in such a way that 'human-centred' assistance has become much more difficult: "There have been situations where I needed to wait for 20 minutes or so, simply because the connection is not optimal. I remember that not too long ago, you were able to ask the bus driver to wait or signal your connection that you were on your way. But nowadays, schedules are so tight that it just leaves." (TP5I, Ap72).

However, most participants noted that they have no real difficulties in transferring as they prepare their trip and take enough time.





2.3.14 Q14: How do you experience exiting the bus or train?

Elderly:

It was noted that exiting the train and finding the right directions can sometimes be difficult. Both TP3E as TP2E and TP4E shared the challenges they experienced when arriving at certain, often larger, central stations. "With a bit of bad luck, you check in again, but then you also have to take a small staircase, and then you are just liberated from public transport, I will say, then you are just in Amsterdam where you have to be." (TP3E, Ap41).

There is a high awareness of their surroundings and thereby the risk of confusion as soon as something changes can be perceived at the larger stations. Signage was named as a clear and helpful tool.

2.3.15 Q15: How do you experience your stop or station of arrival?

Elderly:

All the participants agreed that it was not always immediately clear how to navigate through new stations. Still, all also agreed that there is usually enough signage that this turns out alright. TP3E and TP2E spoke about the importance of signage relating to the station's surroundings as well, to orient themselves and head the right way, such as which streets lie against which sides of the station and which side is the city centre. TP3E remarked that this could differ with a station over time, as station areas are often tinkered with in the Netherlands. He also remarked that once you exit the station, it becomes very difficult to ascertain which street you are in, as the signage of that can be very little. Furthermore, all the participants indicated that they knew how to embark on the last mile and with which mode of transport, as they had looked it up during the initial journey planning process.

Low-Income:

Mostly, the participants knew where to go. If not, they would read the signs or follow the crowd. TP5I arranges the exiting with Valys. They ensure that she can safely exit the train and then also take her home.

2.3.16 Q16 How do you make the 'last mile', what kind of transport do you use and how do you experience this?

Elderly:

When it came to the transport mode for the last mile, the participants had varying answers. All participants noted that, generally, they don't mind walking. TP1E even went





as far as to say he always walked. As someone who travels a lot, TP3E uses many different modalities to get to the final destination. However, “two out of three times (I travel, ed.) on foot and one of the three times by bicycle. And then my own bicycle or a public transport bicycle and yes, those other cases are negligible.” (TP3E, Ap 42). TP3E also said that when he uses modes of public transport, he prefers the metro or tram over the bus because they are more comfortable. TP4E said they do not mind walking, but if the city has a good public transportation network, he will use it, such as the trams in Amsterdam. The participants agreed that the last mile does not take too long and is usually very doable. TP2E and TP4E mentioned that it is usually in Amsterdam that the public transport can be full, making the trip far less enjoyable.

An interesting comment was, however, made by TP4E revolving around the last mile in rural areas. “My brother lives in Schijndel, (a village in the Netherlands, ed.) I wouldn't dare to go there using public transport! Then I should first take the train to Den Bosch, then the bus and then walk a long while, and so forth. So, then I just take the car.” (TP4E, Ap60).

Low-Income:

TP5I needs to think about every ‘mile’ she takes as she depends on her wheelchair for mobility. Valys – a service company for less mobile – is highly reliable in doing so, she says. However, she sometimes also uses the service of a shared taxi service where she runs into difficulties: “It sometimes happens that the taxi is much too late or too early. Usually too late. Once they even forgot (to pick up, ed.) my daughter, who is also disabled. After an hour, I decided to go pick her up myself.” (TP5I, Ap73). This is why she uses Valys most often. When asked if they have an app, she notes that she thinks that the application is a bit too complicated. Therefore, she usually calls the service by phone.

The other participants also arrange their last-mile transport before arrival. Knowing where to go and what options there are. It depends on the destination what modality is being used.

2.3.17 Q19 Finally, do you ever feel unsafe during your journey?

Elderly:

Two of the participants indicated that they never felt unsafe. Finally, TP2E stated that he does feel more unsafe when it is dark out. At such hours there are fewer people about, as well as a reduced sense of general safeness.

Low-income:

The majority felt safe, except for two. The issue was with a road that is predominantly bicycle orientated, making it very unclear for pedestrians to know where to walk. The





participants declared the street unsafe as passing cars could not always see them from a certain angle. In addition, there is no formal cross path (no cross paths, basically).

2.3.18 Other comments of note:

Elderly:

One of the participants stated that he is very happy with the public transportation, but it would be different if he did not live in the city centre. TP3 discussed when asked how the people he knows who have difficulty planning journeys digitally do not lack any skills related to the transport service environment but rather digital skills. This was likely due to not being able to formulate questions so that the computer could understand logically, something humans are far more flexible. Once a person has some digital skill, they can look up more information, but getting there is the challenge. TP4 stated that his public transport story is largely positive because he also has a car that he can use when needed. When visiting a relative in a largely rural area, he has a very bad experience with public transport there. But those experiences aren't considered here because he takes his car to visit this relative. Others who do not have the luxury of taking the car might therefore tell a different story.

Low-income:

Overall, standing at the bus stop is safe for them. The only real issue is stepping in. Afterwards, the safety level spikes up when they quickly find a seat that is difficult to find in a crowded bus. Their safety is in jeopardy as sometimes the driver will turn on the engine and drive while the participant is still on the way to their seat. The possibility of losing balance becomes dangerous the higher one's age is.

2.4 Summary of results

Due to the small sample size, it is not possible to generalize the results, meaning the experiences of the four elderly in this study do not necessarily reflect all the experiences of elderly in Tilburg. If referred to the elderly or elderly in general, we are referring to participants in this study. The same goes for lower-income participants. Within this limitation, the results provide rich qualitative data expressing how elderly, women with lower income and wheelchair users experience their transport journeys.





2.4.1 Elderly Opportunities

- The elderly in this study are retired and therefore have **more free time**, making travelling outside rush hours easier and preparing. **They appreciate the discounts.** This results in the elderly making **more leisure** trips than they would otherwise do, **boosting their travel confidence.** They **travel outside of peak hours**, often for **leisure and family.**
- Elderly stated to experience **no difficulties operating ticket vending machines, paying with a transport card and checking in** at stations. In the beginning, they sometimes struggle to figure it out, but when they know it, they keep on using it.
- The elderly are resilient and able to **ask for help**, but they need to feel comfortable doing so. Three of the participants were able to replan their journeys on their smartphones while travelling. The other participant did not have a smartphone but said that when he cannot find the way, he visits the helpdesk or asks passers-by for directions.
- This group is diverse. **Some elderly have good digital capabilities** and are not help dependent. These are often elderly who perceive no financial limitations, which could be an indication that their **jobs before retirement have provided them with these digital capabilities.**

Challenges

- They are often **insecure about their digital abilities.** Even if they manage to find the correct information, they **don't trust this information** to be correct completely because they **doubt their ability to find it.**
- Elderly tend to **blame their inability** if the information is incorrect or a schedule changes, even if this is not always the case. They agree that it sometimes can be difficult for the elderly to find information if its cluttered but also that it can be easier since many elderly depend on public transport. Often, they manage to find the information online and often they **write the information down to be sure they have it at hand** when needed during the journey. They do this because they are unsure to find the information digitally on the spot. This can cause difficulties **when travel directions change** during the trip.
- They **need amenities**, such as **protection from the elements, lavatories and places to rest.** If an elderly person is feeling cold, they might avoid using public transport





entirely if there are no places to cover. Furthermore, the elderly also need to use the bathroom more often than younger people. If there are no toilets available, then this can make waiting or the journey itself very uncomfortable.

- Elderly stated to have **difficulties processing much information** at the same time. Signs, websites and apps that show a lot of information at the same time are perceived as cluttered and not helpful. Having more information is not always better.

2.4.2 Low-Income

Opportunities

- **Exclusion due to finances does not limit their digital capabilities.**
- They **check fare prices beforehand** to shrink the chance of surprises and give them a feeling of security.

Challenges

- They often are **smartphone-dependent**. Often, they **don't have both a computer and a smartphone**. If they have to choose, they choose for a smartphone and use it also for actions you would otherwise use a computer for.
- Money is limiting their travel behaviour. They **only travel when necessary** and often **rely on discount tickets**. If these are not available, they make the decision not to make certain trips.
- **Cash payment is preferred over digital payment**, not due to lacking digital skills but because it is **easier to keep track of cash** and not be in a position where they have to pay more than they have.
- They sometimes completely **depend on Wi-Fi** for the internet during their travel. If they need internet because the trip changes during the journey, they rather ask for help than spend calling credit.
- **Insecurity**: Although they might not directly say it, it is evident that **money plays a role in their insecurity level**. This is concluded by the **amount of preparation** they take to **ensure they have enough money for the trip**. Such as **checking the amount** of the trip beforehand and, in other cases, only making specific trips they know they





can afford due to the **discount tickets**. **Knowing what and how much you pay is an important part of their security.**

2.4.3 The journey

Fellow passengers

Fellow passengers don't form a barrier in the elderly and low-income participants wanting to take the public transport. **Fellow passengers are ruled out as 'gum under one's shoe'. Annoying, but part of life.** This does not negate the participants from being wary of them. This especially becomes the case when the participants are older, can't always stand anymore and have to use seating. In Dutch busses there is designated seating for elderly. Sometimes, other passengers don't want to stand up from these seats to let them sit. These situations make elderly feel uncomfortable.

Some participants, would look around and **feel alarmed** whenever other people, especially **people with a migration background**, would **look at them** in a 'funny way' followed by them speaking a foreign language.

Moreover, it has happened on certain occasions that fellow passengers **did not feel the need to stand up for people in wheelchairs**. One of the participants mentioned an often-overlooked factor: **not all disabilities are visible**, so there is **not much compassion** and patience for most of the time. The participant went on to say that this has **deterred her from using the bus** in a short period after that.

Bus service in general

bus service was deemed a **reliable default mode of transport whenever needed** (in reasonable hours, of course). Even if there are delays, it does not pose an issue as the participants said they would always meet earlier than when they need to arrive at their end destination.

Bus interior

Not an issue. **All participants noted that the bus is clean** only the unruly habits of fellow passengers are a thorn in the eye. The uncleanness does not deter them from using the bus in future situations.

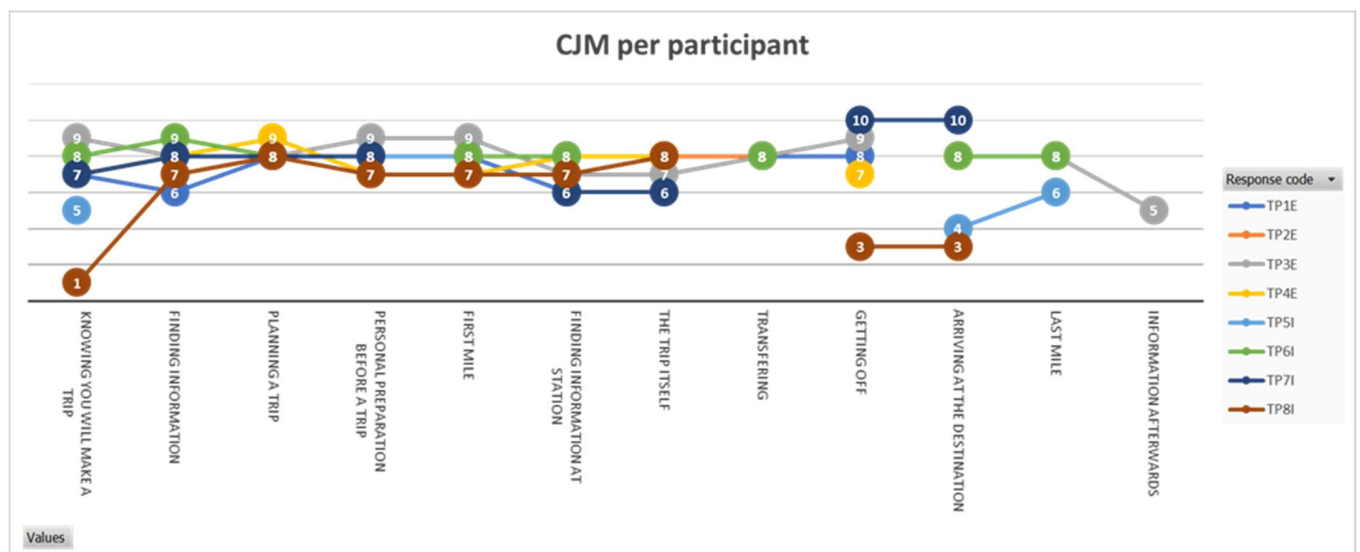
The trip itself



It does what it needs to do, **bringing a person from point A to B. During the pandemic** they sometimes feel uneasy: the participants all noted their **reluctance to use public transport** as they would be packed together with no proper ventilation. Another interesting thing is how the participants all have noticed one thing in common: the unsafety that fellow passengers bring along. They would go on to support their argument that people have become more inconsiderate. They would remove their face masks during the trips or travel knowing that they have symptoms of the virus. Another issue that especially an elderly, less mobile lady would view as important is the temper most people nowadays have. The smallest things seem to set the other off. For example, one of the participants was yelled at for accidentally standing too close to a person in the supermarket. Another person said that the homeless people near her bus stop would walk up to her without a facemask and get aggressive when she mentioned wearing one.

2.5 Customer Journey Map Tilburg

Graph 2 Costumer Journey Map Tilburg (n=8)



In general, the customer journey experience in Tilburg was very positive. Unfortunately, not all scores were asked by the interviewers, so some information is missing. On average, the participants gave their journey a 7,4 with an average. The individual highest score was a 8,1 and a 6 the lowest.

Variation between groups was the highest at the first stage: knowing you will make a trip. Most participants were very positive. The two that gave it an insufficient score are also the participants who have extra challenges. TP5I gave a 5 and is in a wheelchair. This makes



travelling stressful for her. TP8I suffers from depression and travelling to a new location triggers anxiety.

All participants gave a sufficient score for planning and finding information. Some find it very easy, and others more challenging. The lowest score was from TP1, who finds the abundance of information online confusing sometimes. Everyone is very pleased with planning and preparing for a journey.

During the journey, they are all pleased with the first mile. Most of them walk or cycle to the station. In general respondents find it easier to find information online than in the station. That is because they find the information boards sometimes confusing due to the abundance of information. Still, they all gave sufficient scores. That is the same for the journey. Most of them do not particularly enjoy the journey although the elderly, who often travel for leisure, generally enjoy the leisure trip. If they travel, they prefer not to talk with passengers and be left alone.

Transferring is often not an issue; all are prepared beforehand and perceive waiting time not as excessive. The participants who rely on pen and paper for travel information sometimes experience problems if things go differently than expected. Getting off is normally not a problem except for TP8I; unfortunately, this was not specified in the interview.

Arriving at the station is confusing to some. The two who reported the lowest scores are also the most hesitant when making the trips. They reported orientation themselves at the station as confusing, and the one in the wheelchair was afraid the new location would not be accessible to her. All respondents say they appreciate the signage at the station. Especially when it also gives them more information related to orientation, like where the city centre is or to what street a specific exit lead to. The last mile is again perceived as fine.

The information received afterwards could be better. The participant who gave this a 5 finds it difficult to see how much he paid for the trip.

In general, the travel experience is very positive. Finding information online is perceived as easy and doable. Finding information on location is sufficient but perceived as more difficult—the main challenge in finding the right information is the abundance of it online and offline.





3. Flanders Case

3.1 General information on mobility and the digital gap in Flanders

Flanders chose to investigate the users of the dial-a-bus service called “Belbus”. This is a service from “De Lijn”. The Flemish Transport Company De Lijn is the external independent agency within the Mobility & Public Works Policy Area of the Flemish government that is responsible for urban and regional public transport in the Flemish Region. The dial a bus helps people travel by bus in less populated parts of Flanders, where regular public transport falls short. This bus service only runs on request and has no fixed route or timetable. The dial-a-bus only stops at De Lijn bus stops requested from the dial-up bus exchange for the journey. The normal rates and De Lijn tickets also apply to the dial-a-bus, and all dial-a-busses are wheelchair accessible.

People can reserve upfront via phone or internet, and Flanders wanted to investigate to what extend elderly are struggling with this service and which parts they deeply appreciate. This resulted in an interesting analysis of the experienced digital gap of elderly using the dial-a-bus in Flanders.

Once more, the full interview transcripts can be found in Customer Journey Mapping, Appendix. The participants of this group are coded as FP[#] in which FP stands for Flanders Participant, and '#' represents the unique number of the individual participant. Sometimes scores related to these statements are added between brackets, e.g. she expects that she would not be able to plan a trip digitally (1). In the case of direct citation, Ap[x] is added in which 'A' stands for Appendix, 'p' for page, and 'x' the page number.

3.2 Participants

Table 2 statistical overview of participants in Flanders (n=7)

Digital capabilities	Every day/Once a week	Once a month/ more than 3 months ago	Never
Computer	0,57	0,43	0,00
Smartphone	0,71	0,29	0,00
Internet	0,57	0,43	0,00
	Average	Std.s	Min
Confidence level	6,1	3,6	1



Transport	Every day/Once a week	Once a month/ more than 3 months ago	Never
Bus	1,00	0,00	0,00
Train	0,43	0,57	0,00
Bike	0,57	0,43	0,00
	Every day/Once a week	Once a month/ more than 3 months ago	Never
Sharing services	0,00	0,86	0,14
Digital taxi services	0,00	0,86	0,14
Limitations	Not at all limited	Slightly limited	Very limited
Financial	0,57	0,29	0,14
Availability	0,43	0,57	0,00
Facilities	0,86	0,14	0,00
Safety	0,86	0,14	0,00
Disability	0,71	0,29	0,00
Digital requirements	0,14	0,29	0,57
Digital skills	0,57	0,14	0,29
Demographics	Average	Std.s	Min
Age	67,9	2,0	65
	Male	Female	Total
Gender	0,14	0,86	1,00

The statistical information from this sample is unlikely to represent the distribution of people in Flanders as a whole, due to the small sample size. This table is provided purely as a summary of this particular sample. Since this study aims to collect micro data, a detailed description of each participant is given below.

FP1 is a 71-year-old woman who has never used a computer. She does own a smartphone but hardly uses it. She has never used the internet. Therefore, she expects that she would not be able to plan a trip digitally (1) and if she had to, it would limit her very much, just like other actions requiring digital skills. Still, this does not stop her from travelling. She uses the bus every day and very occasionally travels by train. The bike she almost never uses due to an accident. She has never used shared cars and bicycles or other digital sharing services. Her preference for the bus over the train is because the bus is cheaper. Costs



limit her a bit in her travel behaviour. She experiences no restrictions at all regarding the dial-a-bus. She is very satisfied. The dial-a-bus helps her not to get lonely and isolated, especially after her accident, now that walking to the regular bus stop is too far. Safety and comfort do not limit her if there is a bench at the stop. She experiences no restrictions during her journey, but she must be careful not to fall. After her accident, she does not travel by train anymore because the distance between the platform and the train doors is too big.

FP2 is a 69-year-old man who uses a computer and smartphone with the internet daily. This gives him a lot of confidence in his digital skills (9), and he assumes that he would be able to book a trip digitally or figure out a new digital service without any problems. He travels every day by bus and by bicycle. The train at least once every three months. He has never used digital mobility services and shared mobility. Costs play a role in his mobility choices. That is why he opts more often for the car than for the train. availability of public transport also plays a role in his choice. Infrastructure is no problem at all; he feels safe and has no physical limitations that affect his travel behaviour. He does find it restrictive that he has to book the dial-a-bus two days in advance to get the time slot that suits him; he does not think the offer is ideal.

FP3 is a 66-year-old woman who uses a computer and smartphone with the internet every day. She does not experience digital scheduling as a problem. She is confident in her digital skills and about trying out a new digital service. She travels by bus and train three times a week, and she cycles every day. In winter, she takes the bus more often than the bicycle, especially to her mother, whom she sees every day. She has never used digital taxi services and sharing services. When planning the trip, she is not at all limited by the cost. She has a 65+ card, so the costs should not be too high. Her travel restriction is not digital but rather linked to availability. There is little transport available in her hometown. The bus does not run after 9 p.m. She is satisfied with the facilities at the stop, especially with the shelter when it rains. She is not subject to any limitations about safety during the journey. Overall she is very satisfied with traveling with public transport. She has no physical limitations and experiences no limitations except a low frequency because buses only run every two hours and do not always connect well.

FP4 is a Flemish woman of 65. She uses her laptop and her smartphone with the internet every day. That does not mean she looks up everything on her phone. She mainly uses it for calling and WhatsApp. If she had to book a new trip with a digital aspect, it would be very limiting to do it alone. She would rather have help at the counter because it is more personal and can answer questions better. If she could ask for help planning a new trip, she would rate herself a 7 for her confidence that she can handle this independently. She travels regularly. Three times a week, she takes the bus, the train, and the bicycle. She





does not use shared mobility and digital taxi services. The available budget plays a bit of a limiting role when planning routes. The services and facilities at locations do not limit her at all. She also generally feels safe in transport, but this is because she adjusts her behaviour and avoids risks by, for example, not taking the last bus or train. Although she suffers from hearing loss, this does not limit her travel behaviour. She is perfectly capable to travel independently.

FP5 is a 68-year-old woman without a computer, smartphone, or internet. She would also find booking a trip digitally very restrictive "that is actually not possible for me" (FP5, Ap133). However, she still travels every week by train and the dial-a-bus. She no longer takes regular buses because if she does, she has to walk too far. She can no longer cycle; she does not have a driving license, and she never used shared mobility or digital taxi services. It would therefore be very limited without the dial-a-bus. Fortunately, the dial-a-bus does exist where she lives. Costs do not limit her when using the dial-a-bus. The service is in order, and there is no lack of facilities at the stop. Safety does not limit her either, "It's all pretty normal" (FP5, Ap138). She has trouble walking long distances and her knees hurt. For example, at a station with a low platform and a high train, she has to "really pull herself up" (FP5, Ap137), which is why the dial-a-bus is so nice. Then she does not have to walk that far.

FP6 is a 69-year-old woman. She has never used a computer and the internet but does have a cell phone that she uses every day. She would also be very limited if she has to use a digital tool for her journey and has little confidence in her digital skills. She travels every day by bus and at least once every three months by train. Her husband helps her find all the information for her. She is very dependent on him. In addition, she has been cycling for a long time and, like the other respondents, she has never used shared mobility or digital taxi services. Costs, physical ailments, or safety do not limit her travel behaviour at all, although the poor connection of buses is sometimes a reason not to use public transport.

FP7 is a 67-year-old woman. Technology is no problem for her. She is confident in her digital skills, and planning a trip digitally is no problem at all for her. She uses her computer and smartphone every day to explore the internet. If she plans a new trip, she does not think she will run into problems (8). However, she does not often make new trips because of her poor eyesight, limiting her when making the trip. If she must make a new trip, she needs help from her children or friends for the journey. Yet, she gets on the bus or the bike every week. The train is already more than three months ago. Like the other respondents, she has never made use of shared mobility and digital taxi services. Costs, facilities, and safety are factors that do not limit her travel behaviour.





3.3 Detailed Results Flanders

3.3.1 Q1 If you have to make a journey, how comfortable do you feel in general?

For most participants, making a journey is not a problem. Most respondents feel comfortable making a journey to a destination they already know. Most of them mentioned the rain as annoying, but it does not stop them from making the trip in most cases. (FP1, Ap102) Without rain, moving is no problem. I always travel alone, but I don't go when the weather is bad. Also FP5 (Ap133), has no problem travelling however it is, less comfortable when it rains because there is often no shelter. For others, bad weather is less of a problem: Even if the weather is bad, that's no problem. I'm dressed for it. I usually travel alone. The bus is usually on time, but I make sure that I am there fifteen minutes in advance, but they know that when they have the time, and it does not interfere with their plans, they leave earlier anyway. Often it is a driver you already know. Usually, I am the only one, and I travel unaccompanied. (FP6, Ap142) My travel experiences are positive. I don't experience any stress when I move, not even when it rains. I usually travel independently. Others stated similar good experiences. If lower grades were given, like the seven from FP7 (Ap150), it is due to the limited supply of the dial-a-bus. FP7 (Ap 150) mentioned: If I have to go to the hospital, I will arrange that in advance. Then I call "De Lijn", but then there are usually no buses. Then I have to call everyone, do you have time, because I can't arrange a bus. When I travel to a known location, I go alone. If not, I will ask my daughter to bring me.

3.3.2 Q2: And if you now have to make a journey to a location where you have not been before?

Participants stated different experiences depending on their digital abilities. FP3 (Ap118), for example, would not see travelling to a new location as a problem. She finds it easy to figure out how to get there and perceives the trains in Flanders as well organized. For others, it is more challenging. For FP4 (Ap126) It costs a lot of time to figure it out. She does this digitally, but she needs an address. She starts by searching for a nearby bus stop and estimating the time it would take her to get there, but she does need help because she cannot find everything herself. Asking for help is sometimes perceived as difficult because she does not feel very comfortable asking for it. If it is urgent and she knows how to get there by bus, she takes it, but otherwise, she depends on a taxi. This shows that FP4 can do some basic planning herself but quickly needs help when it becomes more complex.





Others are completely help reliant, and there seems to be a hierarchy in who they ask for help. Below are some exemplary stories, based upon the interviews.

FP6 does not plan her trips independently. She completely relies on the help of her husband and feels comfortable with this. She even grades this a nine out of ten. "If I have to go somewhere I don't normally go, my husband arranges it and maps it out." (FP6, Ap142) If he does, it works, I trust him. Suppose I need to travel to a place I've never been before, urgently; I'll take the bus if I can. Otherwise, I will ask someone to drive if there are no public transport options. FP1 would also not be able to do this independently. When planning for a trip, she would ask family members for help, especially for trips containing transfers. If no family members are available, and it is urgent, she has a second line of support from close friends to ask for help. During the trip, she would ask for help at the station from other passengers. Also, FP5 relies on family members: "Then I need my daughter's help, she can look it up on the computer, but she doesn't live that close." (FP5, Ap134). This shows the importance of family ties for vulnerable to exclusion groups. There are also indications that, because they rely on others for help, also travel less. FP5 (ap134) stated for example that it is rare for her to travel to new places, her destinations are fixed.

There also seems to be a hierarchy in the people they ask for help. The first option is spouses if available. They often feel comfortable asking spouses for help, the second line is children, but they don't want to burden them but will if needed. The last line of support is close friends. The elderly with no partners, no children or close friends either have to improve their digital capabilities or are likely to experience serious mobility exclusion.

Asking for help is something perceived as necessary, but they do feel embarrassed by their inabilities. FP7 stated that when she needs to make an urgent trip to a new location, she will call everyone to see if anyone has time to come with her but continued by stating that: "I don't like having to rely on children or friends. I find it disturbing that I have to call: 'can you drive with me' (FP7, Ap150).

These stories show that travelling to a new location certainly is more challenging for some participants than travelling to a known location. It also showed the importance of both qualitative analysis since 71% of the respondents said they felt very confident in their ability to go to a new location (scored above 7), only one respondent said he would not have any problem with it. Another would need to invest a lot of time. The others are not able to travel independently to a new location without help from relatives.





3.3.3 Q3: While planning a journey, how do you experience finding information?

Also, in this group, you see a difference in the people who find the information themselves or rely on others to do it for them. Again FP3 (Ap118) is the only one who does not struggle with this. If she needs to plan a trip, she does this via the internet. Because she perceives the websites of both DL and NMBS in Flanders as good, she does not struggle. The next group are participants who can do it themselves but don't perceive this as effortless. FP4 (Ap126) experiences finding information as easier if she knows the area a little. That's why she plans well in advance to avoid unpleasant surprises. Usually, she finds the information online but with the help of others. Luckily she finds that the travel information she finds online is always correct. When selecting a route, time, cost and effort are important for her, and she feels comfortable with finding this information; she even grades this an eight! "Because I can manage how to do it more and more, I no longer give up a trip because it is too complex to plan or arrange".

For others, finding information is more challenging. FP2 (Ap110-111) experiences the search for information digitally as not very useful because the information is very limited and short. This is interesting because others refer to much information as cluttered and difficult to understand. This could indicate that there is a fine line between too little and too much information, and there is a good chance you cannot please everyone. Luckily, the information he finds is usually correct. Costs do not play a major role when he travels, but the DL subscription for 65+ is much appreciated. Just like FP3, costs are not the only consideration. FP2 also looks at the effort a trip will take, especially with regions that are not attuned to each other; "I sometimes have to switch on two dial-a-buses. I'm not too fond of that. Sometimes I also forgo a trip with the dial-a-bus because they don't connect.". For example, to Heist op den Berg.

Besides a group that can struggle or don't see the benefit of finding information online, there are also participants who do not look for information online but do at the signs. FP1 is such a participant: I do not look for information online. I look at the electronic signs at the station, although they are not always correct. At the bus, I look at the signs of the bus stop (FP1, Ap102-103). If signs don't help her out, and she needs travel information, she feels comfortable asking friends (graded a nine) and sometimes with the help of a counter clerk at the station (graded an 8). Costs play a bigger role for her, that is why she usually travels by bus, because it is cheaper than the train, even if it takes longer. Luckily the effort this costs her is minimal because of the dial-a-bus, she states.





Others are reliant on others like FP5 and FP6. FP5 (Ap134-136) does not look for information because she always makes the same trips. "I just know it, and otherwise, I ask my daughter for help". FP6 (p142-144) never does the planning herself. That is what her husband does for her. The information he comes with is always correct. He does not really care about costs. When she travels alone, he does not look at the effort the journey will take. "That would not be a problem for me, but it is for him" (FP7, Ap150). But also her husband cannot find everything online. That is why they sometimes forgo a move because it is too complex.

All the respondents who do it digitally do it themselves and feel an increased sense of agency. They do not need any help and find the correct information. The second group, the people who do it themselves but not digitally, need the signs at the bus stops and often help from a clerk. The last group is completely help-dependent and relies on partners or family members. This is also the group that rarely goes to a new location. Their answers indicate that this is mostly by habit instead of limitation, the question remains, where does the one start and the other begin.

3.3.4 Q4: And how is your experience with the dial-a-bus

All participants experienced a smooth process when calling for the first time to a dial-a-bus. The waiting time is sometimes long, and they wish buses would go later in the evenings, but in general, all participants are happy with this service, and many rely on the phone service due to their digital inability. They are always well helped and find the calling process easy and doable.

Reasons to use the bus

The participants mostly call the dial-a-bus to go to their family. "I started using the dial-a-bus after her retirement because her mother used the dial-a-bus." (FP2, Ap111). "Especially in winter, I use the dial-a-bus to go to my mother." (FP3, Ap116). And FP6 takes the dial-a-bus at least three times a week to visit her grandchildren.

Getting informed before the call

Some participants got informed about the trip via promotions, signs at the bus stop, saw them passing by, or got to know about it from family and friends. "I got to know the dial-a-bus via a bus on the market. And then I checked what it was, they explained it and gave me the number. I called, and they gave me my customer number. Now I still call (11 years already). The opening times are not a problem; I take it into account. I always get good help, and I do not find it too complex." (FP5, Ap135).





Others got informed by the information at the bus stops: The information at the bus stop helped me get informed. I do not search for information online. Instead, I usually call the service, who then gave me the number (FP1, Ap103). I always saw them (the busses) passing by, and then I asked here and there how this works. I didn't look it up online (FP7, Ap150). Only FP2 found out about it online: "I did this digitally, via Google." (FP2, Ap111).

All respondents are aware that they must call upfront. Most do not see this as a limitation, but some would like to book with less time in advance.

When booking my first trip, I was aware of the time it would take me to pre-book, and I do not see this as limiting my options, although I do find it annoying; "It is a shortage of the system. Why not just book a bus an hour in advance through the internet?" (FP2, Ap111). FP7 is neutral about the experience. "It is just something you have to do beforehand." (FP7, Ap143). "I reserve the dial-a-bus at least an hour in advance, but I usually do it the day before. I am well satisfied with this. I do not see pre-booking as a limitation. The reason I book early is to ensure that the dial-a-bus is available at the time I want." (FP1, Ap102-103). FP4 can even book up to a month in advance for the same reason and is also satisfied. FP5 agrees; "I know, you have to take that into account. Especially during the holidays because then the drivers are not always there, then there are fewer busses, then it is certainly a puzzle to get one. It is also normal that you have to book in advance. It's good that it's there" (FP5, Ap135).

For FP3 and FP2, it is a bit limiting: "This pre-ordering sometimes limits my options because I depend on the service. For example, going to a restaurant. If it (availability) doesn't fit, I go by car or bicycle." (FP3, Ap118). Availability is a bigger limit for FP6: "If it's full, I can't go to my grandchildren" (FP6, Ap143).

First time calling

All participants had a positive experience the first time they called, some were a bit nervous, but all were positive and helped very well. For some, the first time was a bit of a search. "It is my husband who always does that for me. I did not search myself, and I do not use the website. luckily calling is not difficult for me." (FP6, Ap142). "Calling was a bit awkward at first, but I immediately had a good feeling about it." (FP2, Ap110). For others, the contact feels natural. "They are easy to contact. I am very happy that I can call before eight in the morning and late at night. First, I was a bit ill at ease since I did not know much about the organization. Sometimes it takes long." (FP1, Ap103). "I experience my first conversation as perfect and pleasant. I was well helped with creating an account and customer number, and she helped me well with the move I wanted to make. I found this easy." (FP3, Ap119). FP6 and FP7 have similar experiences. "When I call, I first give my





customer number, then they already know who I am." (FP6, Ap, 143). I got good, quick help, although the waiting time is sometimes long (FP2, Ap111). "I find it easy to make an appointment by phone. I've been doing that for eleven years now, and it hasn't bothered me yet." (FP7, Ap143).

Planning a repetitive journey with the dial-a-bus.

The participants generally feel comfortable with this. (FP1, Ap103) Now I make a phone call and immediately get the information. I only receive extra information when the dial-a-bus is not running. This hardly happens. I always book repeat trips myself by phone. I feel very comfortable with this (graded a 10). I just indicate when I want to leave and come back. I give my client number, name, and date. This went wrong once. I was at the station; we (myself and the bus driver, ed.) didn't see each other (and the bus left, ed.). Dial-a-bus then wanted to remove me from the passenger list, but I could prevent that by proving that I was present.

FP4 plans trips with the telephone. Booking a ride online is a little slow for her. She has the information she needs to plan in her email, and she looks it up when needed. (FP4, Ap126-127) She likes to use the dial-a-bus. It is very comfortable, and the experience is quite a luxury. She is aware that she needs to book in advance. She does this via phone, and the people are patient on the other side of the line.

Some participants perceive it as an obstacle that they have to know in advance when they are going. "I find it difficult to be bound by the hours. That is why I sometimes take the DL on the way back because I can take it an hour later." (FP3, Ap118). For travellers with special needs, it is extra important to get information upfront. "I am always well helped, although there have been discussions sometimes. For example, during a detour, it is extra important to me that I get off and on in an environment that I know because of my poor vision" (FP5, Ap135). Besides calling, FP7 also uses the website but only from her own computer due to her bad vision: "I also use the website. If I do, I do it at home, on my screen, because then I can enlarge it properly. I am always logged in, so I immediately see an overview of my rides. This makes it easy to plan repeat trips." (FP7, Ap151).

Making new journeys

Some completely rely on others for making new trips, even if they think they would be able to do it themselves. Others use the phone while they can do it digitally and very few prefer to book online instead of calling.





As mentioned, FP6 (Ap142-143) relies on her husband, but she also thinks she could manage it herself, but her husband always does it for her. If she had to plan a new trip, she would do it by phone, but she would ask her son in advance where she could go by bus. This could indicate that she likes to be taken care of and does not really mind the lack of agency. However, also without her husband's help, she still would need help from her son and the dial-a-bus operators.

When calling FP4 (Ap126), describes the process as follows: I look it up well in advance. Then I look at the map digitally, but the operator also helps with the stops – this works easily for me.

FP2 prefers to book trips digitally. "I did not know that this was possible; that is why I have always used the phone until now". When I book those rides, this goes smoothly, and it is handy that I already see my past trips on the website." (FP2, Ap119). FP3 books the trips not by phone but through the website: I use the dial-a-bus to go to my mother. I do this via the website. This is going smoothly for me. In general, I feel very comfortable booking a dial-a-bus (9). FP7 books repeat trips herself with her computer, but she does not travel to locations she does not know, probably due to her bad eyesight. "I don't actually do any new rides. Especially if I have to switch, I could consider combining different modes of transport, the call-a-bus and then a regular bus or, for example, the train. That is something to consider, but I never really go out of the comfort zone that I know. I don't care much about that." (FP7, Ap151).

Aftercare

After booking a trip, people get an email confirmation. The people who use email find this reassuring: I use email and like the service where I receive a confirmation by email. I'm glad to see it's okay then (FP4, Ap126-127). FP2, FP6, and FP7 also appreciate the confirmation via email. "For example, I once saw that I had forgotten a reservation. This provides additional confirmation and security." (FP2, 112). . "My husband appreciates the email confirmation. Suppose this would be via text message then I would also succeed." (FP6, Ap144). "I find the email confirmation easy." (FP7, Ap151).

3.3.5 Q5: the journey itself

The journey of FP1 (Ap97-106).

I'm going to the bus stop. I will not inform in advance whether it is accessible. I see this when I arrive. The stop is easy to find and contains the desired information. This always goes well, also because I travel via fixed stops. The stops are often clean and safe. They





do their best, and there are trash cans. I also appreciate the real-time information boards. These are available at many stops in Ghent. How comfortable I feel while waiting depends on the weather and seating (6). I pay for my trip with an older card because I am 65+. I experience the technological aspect of the payment as very good (10) but should not forget the card. It is difficult for me to get into the old dial-a-bus with one door (5). This is better with the new two-door dial-a-bus. I do not inform myself about this in advance. I do not need help getting on and off the bus. Usually, I feel safe during the trip. Because there is a maximum of three people on the bus, but at the beginning with COVID-19, I pay more attention to children and people with mouth masks. I like it on the bus when the next stop is indicated on the screen. I miss this on the bus. Real-time information helps me to know where to get out. Then I get out. I can do this without help. I rate the boarding, the journey, and the disembarkation with an average of 8. The regular buses are generally easier to get on. But in the regular bus itself, you sometimes have high steps to step on. Now it's not too bad because the buses are not that full (COVID-19) and because I take less busy hours.

The journey of FP2 (Ap106-113).

When I go to a new stop, I don't check beforehand whether it is also accessible. I usually ask when I call what the right stop is. I also have no trouble finding the stop, although it sometimes takes a while. At the stop, I look at the signs. They often provide the correct information. The digital signs are also very practical, although they do not always display the correct information. When the bus comes, I get on and pay with the card. The device rarely does not work. Fortunately, another device at the doors of the bus usually works. If this is not the case, I also have a ten-ride card with me. Payment is no longer a problem. I really like this form of technological payment. After checking in, I find my seat and sit down. There is sufficient space, partly because I travel with little luggage or groceries.

The journey of FP3 (AP113-121).

When I have to go to a new stop, I use Google Maps. This makes it easy for me to find the stop. The information facility at the stop is as desired. The stop signs are well marked. Normally I use the signs at the bus stop to know when to get off. If there are none, I ask the bus driver. Now that that is no longer possible due to COVID-19, I get out when I think we are there.

I pay in the bus with my subscription. If I travel with my grandchildren, it is expensive because they have to pay from 4+. On the train, this is only from 12+. If I can't travel with my season ticket, I just buy a ticket. For new trips, I depend on fellow passengers or bus





driver to know where to get off. To tell me where to get off. Real-time information in the bus would be useful. Sometimes it is stressful when I don't know where to get out.

The journey of FP4 (Ap121-129)

When I start a new journey, I don't look at accessibility. This is not necessary for me yet. The location information is good, although there is sometimes vandalism. Navigation to the stop usually works well. Sometimes it is a bit difficult, but then I use my smartphone to find my way. My husband finds that more difficult, those modern means. He counts on me for that. In general, the environment is safe and clean. I don't have a need for real-time information yet. I would like it if it were available. I know I can find it on my smartphone too, but I haven't found it yet. I experience the waiting for the bus as okay. I pay for the trip with my subscription. The Flemish agency for people with disabilities (hard of hearing) publishes this and is free. I had a ticket for that. I do not buy an m- or SMS ticket digitally. The information provided for this service is sufficient, and I find it fun to figure out. Paying with my subscription is not problematic at all. Getting on the bus is okay for me because I'm very mobile. Steps may be difficult for people who are visually impaired. Because I don't have any problems myself, I don't look this up in advance. Help from the driver or fellow travellers is not necessary: I sometimes help others. The driver also helps others. I feel safe during the ride, and there is enough space. Usually, getting out of the bus goes well. With the dial-a-bus, that is no problem; with DL I sometimes get off at the wrong stop. I'll have to learn that myself. I usually ask passengers or drivers for help if I don't know the stop. That's how I know it for next time. In total, I give my ride experience a 10!

The journey of FP5 (Ap129-138)

When I travel, I go to the stop I know, so I do not have to be informed in advance. I do not use the signs on the stop. The environment is clean. I do not really need real-time information. If the bus is late, I call the dial-a-bus number; they tell me where he is and why he is late. "Then I am well helped." When I get to the stop, I cannot sit down. There is just a pole, and that is it. There is also no bus shelter in that place. Still, I give the facilities a six or a seven, but it is not so convenient when it's raining. Also, standing for so long is not practical for me. He may be late, then you stand for a long time, but usually, they are on time. I pay for the trip with a 65+ card. The 65+ MOBIB card is 54 euros for one year. It used to be free but has now been abolished. Boarding the bus is a little difficult due to the height of the step, but it is okay. During the ride, I have enough space. Usually, I am the only one. I know where to go because I always travel the same route. The driver does





not have to help me with that either. When getting out, I do not find any accessibility issues.

The journey of FP6 (Ap138-146)

I do not inform myself in advance when I start a journey because I am travelling the same route. That is why the stop is easy to find and looks clean. There is no real-time information available, but I do not really need it. They are usually right on time. I feel comfortable; I would even score this a ten. When the bus comes, I check in with a 65+ card. I always have that card with me. I have never bought an M-SMS ticket. I scan my ticket and ask the bus driver if he wants to inform me at the stop. I have no problems with this (10). Boarding the bus is hassle-free for me. I have never needed help. There is always enough space during the ride. Just not on the school buses. I feel secure. Information provision is no problem for rides known to me. On other rides, we have to ask. This is rare, so I do not really miss real-time information. When I get there, I get out without help. The journey and the stop meet my expectations (10).

The journey of FP7 (Ap146-153)

When I make a journey, I do not inform myself in advance where the stop is. I always go to the same stop. It is easy to find. The sign shows the stop I need, and I have never missed a stop either. The drivers all know me, they know I am visually impaired, and then they tell me when to get out. I also do not need real-time information. What I do find difficult is when I have to call from the hospital for a dial-up bus. Nine times out of ten, there is none. That is the hardest part of the bus for me. If there is no dial-a-bus, then I have to take the big bus. When waiting for the big bus and then you see two empty dial-a-buses passes. Then I think: 'why don't you have a bus?'. Then I am not well informed, then they look at a list and say, 'there is no bus'. Then I sometimes got angry. I will remain polite to people because they can't do anything about it either.

Boarding the bus is fine. I usually don't have anything to carry with me, but the driver always helps if I do. Then I check in with my subscription from the Flemish government because I have a disability. I got it for free, so I never have to pay; I like that from the government. During the ride, I have enough space. I feel safe during the ride, and the bus driver tells me when to get out.





3.3.6 Q6: Is there a moment during your journey when you feel unsafe?

All respondents feel safe on the bus. If they do feel unsafe, it is because bus drivers drive too fast, talk to fellow passengers when driving or are on the phone.

" Sometimes I feel unsafe during the journey, for example, if the bus driver continues to chat with passengers during the journey." (FP3, Ap121). "I once felt unsafe because the driver was on the phone all the time." (FP1, Ap105). "In the beginning, I did feel unsafe. That was due to a driver who drove wild, then we filed a complaint, and he had to follow lessons. Now it is fine." (FP7, Ap153). "What annoyed me was that the bus driver of the regular bus smoked during the break on the bus." (FP1, Ap105). This shows that if complaints were filled, this was rare and had an effect.

3.4 Summary of Results

Due to the small sample size, it is not possible to generalize the results, meaning the experiences of the seven elderly in this study do not necessarily reflect all the experiences of elderly in Flanders. If referred to the elderly or elderly in general, we are referring to participants in this study. Within this limitation, the results provide rich qualitative data expressing how elderly experience their transport journey with the dial-a-bus.

3.4.1 Elderly

Opportunities

- Due to retirement, the elderly participants **have more time**. They **travel outside of peak hours**, often for **leisure and family**.
- The elderly are resilient and can **ask for help**, but they need to feel comfortable doing so. If they ask for help, it is **often on family ties**.
- This group is diverse. **Some elderly have good digital capabilities** and are not help dependent. These are often elderly who perceive no financial limitations, which could indicate that their **work before retirement has provided these digital capabilities**.
- **If they can afford it, they call a taxi** if they can't figure it out online
- In the case of the dial-a-bus, participants appreciated that they had to call the first time; they felt well helped and comfortable. **The dial a bus system is very successful for people with low digital capabilities**. The makes the dial-a-bus such a





success is that it is a very personal, human service. They feel comfortable asking questions and feel well helped. Many rely on this system and have made use of it for many years. Even participants who know how to plan a trip online often prefer to keep using the phone service. This is a system that worked well for people with low digital capabilities.

- They **learned about the dial-a-bus service through friends, flyers or promotions, like on the market but not online**

Challenges

- They are often **insecure about their digital abilities**. Even if they manage to find the correct information, they **don't trust this information** to be correct completely because they **doubt their ability to find it**.
- Elderly stated to have **difficulties processing much information** at the same time. Signs, websites and apps that show a lot of information simultaneously are perceived as cluttered and not helpful. Having more information is not always better.
- Some elderly are **completely help dependent on their partners**. Their partner always does this for them, making them not develop digital travel skills. This makes them vulnerable to exclusion if they can't rely on their partner anymore.
- Some elderly **feel embarrassed when asking** for help from others besides their partner. If they do, they ask their children for help but they don't want to burden them.
- They rarely ask for help when **planning a trip outside of their family ties** if they can not find the information themselves.
- Sometimes elderly **don't take a journey because it is too complex to figure out with public transportation**
- Participants who do not have the digital capabilities to figure out a trip themselves also rarely travel to new locations. Even if they can ask for help from family members, this could indicate that they **only appeal to help if it is really needed**.
- **Online promotions** for services with low digital capabilities did not reach the participants. Participants learned about the dial-a-bus through friends, flyers and physical promotions, like on the market.





3.5 Customer Journey Map Flanders

Unfortunately, hardly any scores were asked during the interviews. That makes it impossible to make the Customer Journey Map. Fortunately, the interviews give a good impression of their experience, and this is very positive.

- The participants are relatively old, with an average age of 67,9. Their main reason to travel is to visit family and especially grandchildren.
- They got to know about the dial-a-bus, via friends and family or promotions in the bus stops or at the market. None mentioned the internet.
- Most respondents feel comfortable making a journey to a destination they already know. Like anyone, they find rain annoying, but it does not stop them from making the trip in most cases.
- Travelling to a new location certainly is more challenging for the participants than travelling to a known location. Even though many (5/7) respondents said they felt very confident in their ability to go to a new location (+7), only one respondent said he would not have any problem with it. Another would need to invest a lot of time. The others are not able to travel independently to a new location without help from relatives.
- Also, in this group, you see a difference in the people who find the information themselves or rely on others to do it for them. All the respondents who do it digitally do it themselves and feel an increased sense of agency. They do not need any help and find the correct information. The second group, the people who do it themselves but not digitally, need the signs at the bus stops and often help from a clerk. The last group is completely help-dependent and relay on partners or family members. This is also the group that rarely goes to a new location. Their answers indicate that this is mostly by habit instead of limitation. The question remains however, where the one ends and the other begins.
- All participants had a positive experience the first time they called, some were a bit nervous, but all were positive and helped very well. They like the opening hours of the service and the availability of buses. Sometimes they had to wait long but not excessive. One participant wished the availability of buses on a shorter notice would be higher, but most are well satisfied.
- They like the service so much that the participants who can book it online prefer to call for a bus because it is much easier for them and faster than booking the trip themselves.





- When they booked a trip, the ones that use email, like the email confirmation, someone indicated that she would like to get a text confirmation because she does not know how to use email but does know how to use text messages.
- Bus stops are easy to find. Facilities might be small in some places, but this is only problematic when they are late.
- They don't have problems with entering the dial a bus. Also, the ones who have bad hips manage to get in without help. They all manage to pay with their card. No one uses an M- SMS ticket, and all seem to appreciate the digital payment service with their card.
- All respondents feel safe on the bus. If they do feel unsafe, it is because bus drivers drive too fast, talk to fellow passengers when driving or are on the phone.
- They often know where to get out; if they don't, they tend to blame themselves. There is a general appreciation for real-time information, but it is not a necessity.

In general, participants really appreciate the service. The fact that they have to call the first time could help them feel more comfortable calling if they need help later on. Contrary to the Dutch participants, they do not feel embarrassed to call. Since the service is so good, they keep using it, even if they know how to do it digitally because it is much faster, and they might find the information trustworthy. What became clear is that it is hard to predict digital abilities. One might be reasonably good with a phone, know how to pay by card, be able to read and understand SMS confirmations, but she also might not have an email address and be completely reliant on her husband to plan the trip for her. And be comfortable with this. All participants who have low digital skills need help from friends and family. Those with low digital skills who feel completely comfortable asking for help are also the most prone to exclusion when services change or something changes in their family dynamic.

The participants with medium digital abilities can book their trips online but prefer to call since it saves them a lot of time, and they often distrust their abilities to find the right information. This group is likely to change with the service if it becomes more website-reliant if their necessity is high, making them less vulnerable to exclusion.

Some of the participants in Flanders can be considered as highly digital-skilled. These participants can book the trip online by themselves and can figure out changes relatively intuitively. They are not likely to be excluded due to the digital aspects of their journey. Instead, this group can be excluded through physical and financial limitations. Luckily, also the participants who were less mobile perceived the dial-a-bus service as sufficient.





In conclusion, the service is deeply appreciated, the option to book a bus over the phone is deeply appreciated and makes people less reliant on friends and family. If this changes, they are the ones who are most vulnerable to exclusion.





4. Ancona Case

4.1 *General information on mobility and the digital gap in Ancona*

Ancona chose to investigate the customer journey experience of elderly and people with disabilities who use the local bus service and the digital planning app. Unfortunately, as mentioned in the study limitations, the results are incomplete since there are no recordings. There are only three transcripts collected after the interviews that were done through a phone call. These transcripts are around three minutes and 400 words long, making it harder to analyse them on the level of the other pilots due to the limitation of data. Below is an overview of the results found in Ancona but cannot be validated due to the absence of recordings.

4.2 *Participants*

In Ancona, eleven participants participated in the Customer Journey Mapping. More than half the participants were female (55%) with an average age of 36,7. The youngest was 24, and the oldest was 67. All participants use their smartphones and computers daily. Unfortunately, this does not equal ease with planning trips. On average, they gave their confidence level a 5.7. This also included someone who gave himself a 2 and another gave himself a 10. 64% said they would not at all be limited when faced with a digital task. Almost all the others stated they would be very limited (27%).

Around a third travels every day or at least once a week with public transport or by bike. 36% uses the bus every day or at least once a week. 45% travels by bus rarely, and 18% of the respondents never use the bus in Ancona. This is remarkable when participating in research that investigates the journey experience of the bus. 18% often travels by train, and 73% does this sometimes. When it comes to bike use, people either use it almost daily or never; 36% versus 55%, respectfully. Just like in the other pilots, the usage of sharing services and digital taxi services is low. Only one participant makes use of them frequently. One third has used a sharing service before, and only one has used a digital taxi service. All the others never use sharing services or digital taxis.

Availability of busses is the biggest limitation for this group. 40% states that this is 'very limiting'. Financial capabilities (72%), facilities (50%) and limitations due to disabilities (64%) are the least limiting for this group, although this does not mean that this is not a big problem for some.



The group of eleven consisted of two deaf users, one person in a wheelchair, two people with low visual capacity and a blind participant.

Table 3 statistical overview of participants in Ancona (n=11)

Digital capabilities	Every day/Once a week	Once a month/ more than 3 months ago	Never	Total
Computer	1,00	0,00	0,00	1,00
Smartphone	1,00	0,00	0,00	1,00
Internet	1,00	0,00	0,00	1,00
	Average	Std.s	Min	Max
Confidence level	5,8	3,0	2	10
Transport	Every day/Once a week	Once a month/ more than 3 months ago	Never	Total
Bus	0,36	0,45	0,18	1,00
Train	0,18	0,73	0,09	1,00
Bike	0,36	0,09	0,55	1,00
Services	Every day/Once a week	Once a month/ more than 3 months ago	Never	Total
Rent a car via digital services	0,09	0,64	0,27	1,00
Sharing services	0,03	0,36	0,61	1,00
Digital taxi services	0,09	0,09	0,82	1,00
Smartphone to pay parking	0,09	0,64	0,27	1,00
Limitations	Not at all limited	Slightly limited	Very limited	Total
Financial	0,73	0,27	0,00	1,00
Availability	0,00	0,60	0,40	1,00
Facilities	0,50	0,30	0,20	1,00
Safety	0,45	0,36	0,18	1,00
Disability	0,64	0,18	0,18	1,00
Digital requirements	0,64	0,09	0,27	1,00
Digital skills	0,70	0,10	0,20	1,00



Demographics	Average	Std.s	Min	Max
Age	36,7	11,7	24	67
	Male	Female	Total	
Gender	0,45	0,55	1,00	

The statistical information from this sample is unlikely to represent the distribution of people in Ancona as a whole, due to the small sample size. This table is provided purely as a summary of this particular sample.

4.3 Detailed Results Ancona

Since no individual transcripts can be linked to individual participants, personas have not been described on a participant level. This could have been done solely based on the statistical data, but this has no use without the qualitative stories.

4.3.1 Q1 how do you plan your journey?

Travel time was unanimously important to the participants. Comfort during the first- and last mile is the most frequently used reason people do not choose to use public transport.

When they choose to travel by bus, 91% of the participants say they can easily navigate the app on their phone and find the displayed information easy to understand. However, when planning the journey with the app, 82% of the participants knew which line to take, but only 64% could find which bus stop to go to. When asked about the trust about whether the displayed information is correct, only 64% said they think it is. Still, the same number of participants would rather trust a person to get the information than the app. This means that even though people could get the right information, distrust is still an issue for those who succeed.

A big challenge that the visually impaired participant experienced is that the smartphone screen readers cannot read aloud the information displayed on the app, resulting in the impossibility of using the app. This means that if a digital transportation app is the main source of information for the system, the visually impaired are directly excluded.

Also, finding information at the bus stop is perceived as challenging. The signs are often not made for those that are visually impaired, resulting in some of the participants had the experience that there is no information at all or that it is hard to understand. Also finding information about transfers at the bus station is perceived as not available.



4.3.2 Q2 How do you experience your journey?

When waiting at the bus stop, only 18% participants find the waiting time excessive, while the average maximum tolerance for waiting at the bus stop is 6 minutes.

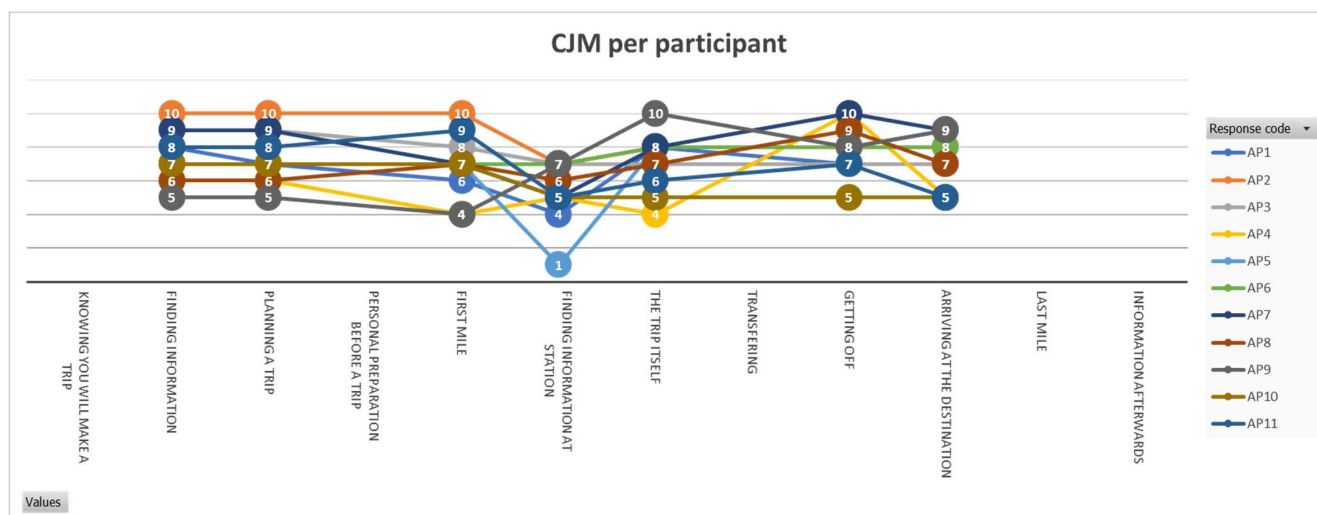
During the journey, 82% think it is easy to find the ticket validator machine inside the bus. However, this often does not work according to 27% of the participants. When they need help, less than half (45%) of the participants perceive the bus drivers as friendly and helpful most of the time. This is especially an issue for visually impaired users since they can't see the information displayed at the bus stop or on the bus itself. When the participant manages to validate their ticket, they experience the availability of seating in most cases as not an issue (82%).

4.3.3 Q3 How do you experience the end of your journey?

Most participants walk the last mile. All women rather do this during the day due to perceived safety. For only one male, this was the case.

4.4 Customer Journey Map Ancona

Graph 3 Customer Journey Map Ancona (n=11)



Generally, the participants are happy with the service. Variation between individuals does exist. Low scores are often related to special needs, like the app not being



accessible for people with bad eyesight. Generally, the lowest scores are given to the route information at the bus stop, which is cluttered and hard to read due to the small font. The other major complaint is that the ticket validation machines often do not work. Below you can find the biggest challenges and suggestions for improvements based upon the answers from the participants.

- Update the bus schedule on the app. Sometimes routes are displayed that are no longer active.
- Make the bus schedule at the bus station easier to understand. Currently, several participants perceive it as too complex.
- The ticket validation machine often does not work.
- The QR code system has to be activated outside of the bus. This is perceived as complicated and therefore not preferred. If it were possible to scan the QR code on the bus, it would be appreciated.
- Not all bus stops are recognizable outside of the city centre and are therefore hard to find. Sometimes they are overgrown with bushes making the bus stop pole hard to see.
- Sometimes inactive bus lines are presented in the app.
- Bigger fonts in the app and at the bus stop help visually impaired travellers. For blind people, the possibility of the use of a screen reader is crucial. Currently this does not work.
- One visually impaired participant suggested a training program for bus drivers to improve their customer-oriented service. Only 45% of the participants perceive the bus drivers as friendly and helpful.
- Some busses are not wheelchair accessible because they stand too far from the bus platform.
- Bumpy pavement is an issue for people in wheelchairs.
- Bus lines do not always connect well, making the transfer time between stops long





5. Barcelona Case

5.1 General information on mobility and the digital gap in Barcelona

According to official data (EMEF 2020), in the metropolitan region of Barcelona, there are 7.2 million trips a day with origin/destination Barcelona. Its density, still very important though not as high as in the city itself, allows most of them to be done by foot (41%). Public transport is the next most important (33% of trips), leaving the car or the motorbike as a minority option (23%). Bicycles represent only 3% of daily trips. Also, Men have higher use of private transport, while women tend to use more public transport.

To find a suitable case study for the digital gap, we focused on a group of low-income women, specifically with a difficult journey to get to work. In Barcelona and its surroundings, there are different industrial areas and other facilities (hospitals, educational centres, shopping centres), whose accessibility is not always found as sufficient as it is in other working places in the city. Nevertheless, industrial-related jobs usually get good wages compared to the average, so we looked in the field of low paid industrial jobs

Through a working union (CCOO), we contacted people in two companies that are in charge of the cleaning and the catering service of one of the major hospitals in the Barcelona Metropolitan Region, the Hospital Germans Trias i Pujol, popularly known as Can Ruti Hospital. It is a public health centre located at the foot of the Sierra de la Marina, in the municipality of Badalona, bordering Barcelona. This location determines its isolation from the urban area. Also, it has difficult access, not suitable for walking, as the hospital was built in a place formerly occupied by a rural property called Can Ruti.

Jobs related to the care economy usually have a higher presence of women, which increases as the prestige of the job decreases, as it is the case of cleaning jobs, so we interviewed 10 women in this situation. We tried to have a variety of ages ranging from mid-twenties to past-sixties to compare different situations. We focused on local buses that arrive and depart to/from the hospital in this case study.

The full interview transcripts can be found in Customer Journey Mapping, Appendix. The participants of this group are coded as BP[#] in which BP stands for Barcelona Participant, and '#' represents the unique number of the individual participant.

5.2 Participants

Table 4 statistical overview of participants in Barcelona (n=10)



Digital capabilities	Every day/Once a week	Once a month/ more than 3 months ago	Never	Total
Computer	0,50	0,50	0,00	1,00
Smartphone	0,90	0,10	0,00	1,00
Internet	0,90	0,10	0,00	1,00
	Average	Std.s	Min	Max
Confidence level	7,3	3,4	1	10
Transport	Every day/Once a week	Once a month/ more than 3 months ago	Never	Total
Bus	0,70	0,30	0,00	1,00
Train	0,20	0,50	0,30	1,00
Bike	0,20	0,10	0,70	1,00
Services	Every day/Once a week	Once a month/ more than 3 months ago	Never	
Rent a car via digital services	0,00	0,10	0,90	1,00
Sharing services	0,07	0,00	0,93	1,00
Digital taxi services	0,00	0,20	0,80	1,00
Payments	Every day/Once a week	Once a month/ more than 3 months ago	Never	
Smartphone to pay parking	0,00	0,00	1,00	1,00
Toll payment with credit card	0,10	0,30	0,60	1,00
Toll payment with ViaT	0,00	0,10	0,90	1,00
Self-payment at the gas station	0,10	0,30	0,60	1,00
Limitations	Not at all limited	Slightly limited	Very limited	
Financial	0,30	0,20	0,50	1,00
Availability	0,40	0,20	0,40	1,00
Facilities	0,50	0,20	0,30	1,00

Safety	0,30	0,20	0,50	1,00
Disability	0,90	0,10	0,00	1,00
Digital requirements	0,80	0,00	0,20	1,00
Digital skills	0,60	0,20	0,20	1,00
Demographics	Average	Std.s	Min	Max
Age	48,8	11,5	28	62
	Male	Female	Total	
Gender	0,00	1,00	1,00	

The statistical information from this sample is unlikely to represent the distribution of people in Barcelona as a whole due to the small sample size. This table is provided purely as a summary of this particular sample. Since this study aims to collect microdata, a detailed description of each participant is given below.

BP1 is a 55-year-old woman who is comfortable using digital means like a computer, a smartphone, or the internet as she uses each daily. This also adds to her confidence in planning an unfamiliar, local public transport journey which she grades 8/10. Travelling by public transport is something which she does every day when she uses the bus. Travelling by train is not something she is as familiar with, but sporadically still does. A bit more often than this, about once a week, BP1 travels by bike. Renting a car is something she has never done, just as using online taxi services, shared mobility or paying with her smartphone. As someone who uses a car once every three months or so, she pays toll with a credit card. Paying toll by ViaT is something she has never done. At least once a month, she also finds herself at the gas station where she uses self-payment methods. In her regular, day-to-day travels, she feels slightly limited by costs and availability of transport services. The availability of infrastructure, concerns about safety and difficulties in planning limits her more. At the same time, she does not feel limitations regarding special needs or because digital skills are required to use the service.

BP2 is one of the youngest participants at 36. She uses her computer, smartphone, and the internet daily, which adds to her full confidence in planning an unfamiliar trip. She travels by bus weekly and by train monthly, never rides a bike. She never rents a car but does share one weekly. Sporadically, at least once in the past three months, she has used an online taxi service. This has, however, been influenced by COVID-19 as she uses this service mostly when going out. On-street bike or scooter hiring is something she has never done, which also goes for paying with her phone. Toll or self-payment are things she never does as she does not have a car. She feels limited by the costs, the availability of services



and infrastructure, and safety during her regular travels. Special needs, planning, or digital skills do not limit her at all.

BP3 is a 50-year-old woman who relies mostly on her smartphone with an internet connection which she uses almost every day. At least once a week, she also uses her computer with which she feels very confident in planning an unfamiliar trip. She hardly ever uses the bus or bike and the train only once a month or so to get around. Renting or sharing a car is something she has never done, just as making use of online taxi services. The same goes for on-street hiring of bikes or scooters and paying with her phone. As she drives a car regularly, she pays toll weekly, which she does with her credit card. At least once a month, she uses self-payment at the gas station. Costs, the availability of services and safety limit her in her daily travels. Available infrastructure and digital skills slightly limit her, but planning and special needs do not.

BP4 is the youngest participant at 28 years of age. Therefore it's no surprise that this woman uses a computer, her smartphone, and the internet daily. Planning an unfamiliar trip is no problem for her, and weekly, she travels by bus and bike. Hardly ever does she travel by train or use online taxi services. Renting a car, bike, or on-street services is something she has never done, just as paying toll with her phone. She feels limited by costs, the availability of transport services, and the safety thereof during her travel. Infrastructure and digital skills limit her slightly, but planning and special needs do not at all.

BP5 is the oldest participant with 62 years old. Her age is somewhat reflected in her computer, smartphone, or internet usage as these are all things she never uses. She also cannot use them because she is illiterate. It is then also no surprise that she does not at all feel confident in planning a trip by using a computer. She does not make use of a bike or train to get around but has used the bus in the past. Hiring shared mobility vehicles or making use of any transport or payment facility are things she all has never done. She feels very limited by costs, availability of service and infrastructure, planning, and digital skills. Less limited does she feel about safety and special needs.

BP6 is 61 years of age and does not use a computer. She does, however, use a smartphone and the internet daily. As she does not use a computer, she also does not at all feel confident about planning a trip with it. Almost every day, she takes the bus, the train, bike, digital taxi services or shared mobility services she never uses. Costs, availability of infrastructure and special needs do not limit her at all. The availability of services does, however, slightly. Her level of digital skills doesn't limit her when planning a trip, but they do when she is travelling.

BP7 is one of the younger participants being 38 years old. She hardly ever uses a computer, but she feels confident about planning an unfamiliar trip through her daily usage of a smartphone and the internet. Every month, she uses the bus at least once. The





train, bike or any other mobility services she has never used. Money is the only limiting factor for her. Planning, digital skills, safety, etc., do not influence her ability to travel.

BP8 is 57 years old. She hardly ever uses a computer, but she does use her smartphone with internet daily. She feels confident about planning an unfamiliar trip, and travels by bus daily. She does not use trains, bikes or other mobility services and does not pay toll but sporadically uses self-payment systems for gas at gas stations. Safety influences her limitations a lot and costs slightly.

BP9 is a 55-year-old participant who uses her computer, phone, and internet daily, which is probably why she feels very confident in planning a new trip. She travels by bus every week but not at all by bike or train. She has rented a car, but this is long ago. She pays toll with her credit card about once a month and gets gas through self-payment every week. She does not feel limited in any way.

BP10 is a 46-year-old woman who only uses her computer about once a month. However, her phone with internet uses it daily, which aligns with her confidence to plan a new trip. She travels by bus and train about every day but has never used a bike or shared mobility-, or digital taxi services. She does not pay toll or gas with her phone. The only limitation she encounters is the availability of transport services.

5.3 Detailed Results Barcelona

5.3.1 Q1 When you know that you will go on a trip, how does this make you feel?

Public transport

Most of the participants travel to work by public transport. Their emotional response when they hear that they have to go on a trip differs between participants. Unfortunately, not all of these feelings are positive. Sometimes this is due to confidence in the system of public transport, like is the case with BP1, BP4, and BP5: "For me, the lack of confidence in the system creates a lot of anxiety." (BP1, Ap165); "Nervous, because you don't exactly know how much time you have." (BP4, Ap187). "It worries me because sometimes I ask for the stop, but they don't indicate it to me well." (BP5, Ap194). This feeling of system confidence likely has a variety of origins, but it can be hypothesised that this has to do with adequate and real-time information provision, both online and in person. Other experiences relate to subjective safety, which for BP2 is the case: "I don't feel safe because the pavements are narrow and there are few people in the street." (BP2, Ap175).





However, not all are so critical of the public transport system: "It is safe and comfortable." (PB10, Ap226).

Car

Very different is the experience of those who travel by car: "I don't prepare anything, my car is parked in the (fenced, ed.) parking of the building. It does not bring up any emotional reaction." (BP3, Ap182). "I am not afraid to go from my house to the car (...). I would rate it as a 10." (BP7, Ap209).

PB9, who also drives to work, expresses that she does not experience any problems but makes no further comment.

As a part of their work, all participants get up and travel in the early morning. The participants often confirm the assumption that travelling in the early morning raises feelings of insecurity and anxiety. A clear distinction in the experience can be identified based on the mode of travel. Most of the participants who travel by public transport describe feelings of anxiety or even fear when they know they will have to head out to travel. In contrast, those who travel by private modes state that they do not have a noteworthy feeling with the prospect of travelling.

5.3.2 Q2 What causes the feelings that you have regarding embarking on a trip?

When asked why the participants feel the way they do about taking a trip, the statements made under question one become clearer. Sometimes it is time-related, like with BP1: "The fact that the journey takes 7 minutes by car and 55 minutes by bus frustrates me most." (BP1, Ap171). "Nervous about being late and missing the bus." (PB, Ap187).

Other times, it is mainly due to safety and the situations in which this is challenged: "There is not much security inside the bus, the other day a few of us got up because there was a drunk. It's scary, not nice. They (the drunk, ed.) didn't want to get off (the bus, ed.) until the police arrived. And I have to go to work! What do I do? How do I justify that I'm late?" (BP1, Ap 169). "I go to work very early; it's scary because you go alone, and I have quite a long commute." (PB2, Ap175). (PB5. p.57) There are no cars, no police, and the lighting sometimes does not work. I would rate it as zero because I am very scared.

As is often the case, specific personal circumstances influence the experience. For BP5, this is magnified as she is illiterate: "Not knowing where I am going makes me nervous and I have to ask two or three people because I don't trust one person. I don't know how to look for information in another way because I can't read." (BP5, p194).





Those who noted that they do not always feel safe during their trips gave various reasons for why this is the case. Some participants noted that they do not feel at ease because of the concern of other people harassing them. Deserted streets where social control is low and the murky physical atmosphere raise feelings of unease and fear. However, not just other people can cause these feelings. Any insecurities, be it information, built environment, or system-related, can also cause feelings that prohibit participants from travelling without worries.

5.3.3 Q3 What limitations do you experience regarding your trip?

The Barcelona participants give various reasons for feeling limited during their travels. This can be due to the price of transport. "I feel ripped off by the price. It's very expensive for what it really is." (BP2, Ap176). "The price score would be a zero because with the salary we have, it should be cheaper." (BP5, Ap196). "It makes me so angry! Public transport is so expensive. I used to take the car before but cannot anymore due to my medication. But the price is not fair, I rate it with a zero." (BP8, Ap215).

A new limitation is the COVID-19 situation. The risks, uncertainties, and restrictions that come along with this bring practical and subjective limitations: "Now with COVID-19, I don't go out much." (BP2, Ap173). "The bike is now parked because of COVID-19, we haven't touched it for over a year. Before COVID-19, I used to travel by bike for both leisure and travel reasons." (BP3, Ap180).

The main limitations that the participants experience are the cost of the journey, the distance of the journey and the safety and security of the transport service. It should also be noted that the safety of the transport service is not only because the journey takes place at night but also because of the current pandemic situation due to COVID-19.

Many of the participants are affected by the early start of the working day and, in some cases, if the weather is bad, they feel less motivated. This is, however, dependent on the mode of travel that is being used. BP3, for example, mostly travels by car and perceives little limitation during rain. This contrasts with BP10, who uses the train for her daily commute.

5.3.4 Q4 How would you say the information provision of your trip is?

The answers to the question regarding information provision start to show an important result of the interviews, namely the location of residence and thus starting/ending point of the trip. "There is always a lack of information. I recently travelled on a bus that provided information both through speech and screens. This was very good, especially



when going to an unfamiliar place. In my neighbourhood, however, we don't have this." (PB1, Ap165). "There is no digital panel, just a sign with the line and the timetables, which also are often incorrect. I have to keep an eye on my mobile phone as the bus stop that I need does not have a digital sign, and the paper sign is not accurate." (BP2, Ap176). "Not in my neighbourhood. Most stops just have a pole that you have to turn to see the bus schedules. However, the letter is very small and difficult to read." (BP8, Ap215).

The above statements contrast notably with that of BP6 and BP10: "I look at the panels; it is easy, and they are punctual. If the panels cannot provide me with the information I need, I usually just ask one of the drivers." (BP6, Ap203). "The stop is good; it has a digital panel that tells you when each bus has arrived." (BP10, Ap228).

The responses to the questions of information provision shed light on the differences in information provision quality throughout the city. Some have no difficulties at all as digital, time-accurate signage helps them. Others are able to ask other bus drivers about the time of departure of their service. At the same time, there are people like BP5 who does not have access to regular information as she cannot read. Or people like PB1, PB3, and PB8 who only have access to analogue means that are not always punctual. The response of PB4, however, shows that even when there are digital means involved and the times are correct; participants can still worry about reaching the stop in time; "Regarding the app, you don't exactly know how much time you have, and you leave the house nervous about whether you'll make it." (BP4, Ap187).

5.3.5 Q5 How is the journey itself?

The journey of PB1 (Ap163-172)

I get up very early, 3.45 am, because I must travel for a long time. I look at the timetable, leave the house, get to the stop, and wait, and if everything goes well, I have between 50 and 55 minutes of journey time on the bus. The N-28, which is the one that takes me to Can Ruti, is the only one that goes there from Santa Coloma, and it's relatively close. It goes through Santa Coloma, Fondo, a big neighbourhood, Sant Adrià, Badalona, the neighbourhood of Lloreda and then goes up there. It's also true that I have the B-19, which in theory is more direct, but it runs every hour, and, in the mornings, I can't dare miss it because it stops somewhere else, and if I miss it, I won't get there.

From where it leaves me at the stop, I have a walk. Where the bus drops me off to where I can get in, I have about 15 minutes because I have to get in through the emergency room. Also, we are very limited because, with the COVID-19, it has been terrible. Now we



only have one access (before we could enter through all the hospital entrances), and depending on where you have to enter, the changing room is a kilometre away. It's a very big hospital, you don't just arrive, and you're there. In the end, it's all about time.

Since we started with COVID-19, the timetables and buses vary. Sometimes one comes and sometimes another. If the same driver always comes, it's easier for him to wait for you because he knows you're coming.

I look it up on the Internet by phone, the time of arrival. This has made it much easier for me because there is a solar panel for information at the bus stop, but when there is no sun, the timetable doesn't work. If I don't have a phone, I don't know when the bus will arrive. It is not broken. I asked the girl I came with, and she told me that if it's not sunny, the panels don't work because they have a very small battery, and they get discharged. So, it does not work so well.

The journey of PB2 (Ap173-180)

After having packed the things that I need (payment method, clothes, etc.) I check the bus departure time on Google Maps and walk to the nearest bus stop (8). The pavements are narrow, and there are few people on the street, which I sometimes experience as not so pleasant. Also, when I arrive at the bus, it is not always there when it is supposed to be (3). Getting on the bus is no problem except for the payment system. Sometimes I have the wrong card, or I run out of credit. Normally this would not be a problem as you can buy tickets on the bus, but due to Covid-19, you can't. This would not be a problem if charging your transport card was easy, but this is not the case. There are too few points and machines where you can do this.

Once on the bus, it is often not clear to me when I have to get out. The signing is not good and not accurate. Therefore, I usually check the planned arrival time before getting on the bus while waiting on the bench. Whilst waiting, though, I do not feel relaxed. The bus stop is near a park and a road. You never know who will come up to you.

Once I arrive at the bus stop, I still have to walk for about half an hour to get to the hospital. A part of this walk takes me over a parking lot, which feels like a wasteland; often, I feel anxious about who I might meet there. However, once at my work, I am glad. It takes about two and a half hours to get to work, so I am always happy to be there.

The journey of BP3 (Ap180-186)

Most of the time, I travel by car. The trip is short, so I never have to prepare anything, I just get up, do my morning things and head down to the parking lot of the building. Once there, I always look around. In theory, everything is closed and safe, but everyone feels just this thing when they enter a car park. However, this feeling is even worse for people





who have to take the bus as the people who go out for drinking and partying are also still out at that time.

When I do take the bus, I find it difficult to understand where I have to go. There is a seat and a sign with the timetables, which are hardly ever right (3). Whilst waiting, I check my phone, but I am also aware of my surroundings as it is unpleasant (3). I sometimes even feel afraid. When on the bus, the bus driver is kind and because I know where I have to get off, I do not have any problem with the lack of information.

The journey of PB4 (Ap186-193)

The night before I travel, I prepare all the things that I need. Then in the morning, I check the ABM Mobilitat app to calculate when I have to go to the bus stop (5). During my walk, I encounter slopes and bad pavements, and the route goes through a park where I have been robbed once. The neighbourhood of San Roque is just an area that is not always safe (2).

Regarding the payment methods, I never really have problems. It is very expensive but other than that I know how to operate the machines and the system. The bus drivers are usually very kind; I often talk to them as I wait, and through the years, I got to know quite some of them, so we greet each other. It is very cold when waiting, which adds to the joy that I have once I get onto the bus (8/9). The bus is usually not crowded in the morning, so I sit down with some music, and the bus takes me straight to the stop that I need. Once there, it is a very long walk to the hospital, especially because it is a natural area with wild animals like boards and foxes. This makes me feel unsafe.

The journey of PB5 (Ap193-203)

Before leaving home, I prepare myself and make lunch. I already stress about missing the bus, even though I know where to go and what time the bus leaves (1). On my way to the bus stop I worry about being in time but am also discomforted by the street atmosphere as the lights do not always work and there is no one around (0). Arriving at the stop is nice, and I am happy to see people there.

I always buy a transport card at a local store. This is nice because then I can ask questions and I don't really understand the machines. When waiting, I get scared by the people there. Usually, they are drunk and returning home from a music bar. This also goes for sitting in the bus, but luckily the bus driver is nice, and the information about where I need to get off is clear. However, once at the hospital bus stop, I need to walk far, and there are wild boars. I feel unsafe there as there is no traffic, I am all alone, and there are wild animals.

The journey of PB6 (Ap203-207)





The night before I make the trip, I prepare the basics, but I am quite relaxed in the morning. The road to the bus stop is good, but sometimes there are some strange characters out and about, which makes me feel scared. Arriving at the bus stop is, therefore, something that I am happy about (9). I check my phone a bit, and the bus is usually on time. Waiting can make me nervous, however, as you never know who will come near you. Once on the bus, the information provided is good, and because I have been making this trip for 30 years, I know where to get off. Arriving at the stop is good; there is not much traffic, and security guards also walk that route (10).

The journey of PB7 (Ap207-211)

I prepare for the trip, think about what I need before doing it and then prepare it. Even before leaving, I check if I have everything. I think I organize myself quite well (8).

I almost always try to park around my flat, so I hardly have to walk. It is increasingly difficult to find parking, but I still find it, as it is an area that is a bit far from the centre. It is different when you go to Santa Coloma downtown or central places, where you go crazy to find parking. But here it is still easy if you arrive before 8:00 a.m. because if everyone from work has already arrived, you have to leave it in some area where the car crane can take your car, but like the next day I get up early, and it may not have passed, so I take a little risk at that moment.

I am not afraid to go from my house to the car. I leave at 6 am, and I am in my neighbourhood. Maybe if I had to go somewhere else during those hours, I would be uneasy. The path is well. I get up; I have half an hour, I take the car to pick up a colleague and then another one. The path is the same every day. I go out and take it as this route by habit, you get into the car, and I am used to it. It is not difficult for me to go to the places, I directly put the Waze app on, and it already tells me how to get to that site. It marks your location, it tells you the time it takes, the meters you have to walk... it gives you everything, then you are already very informed of what you have to do.

During the journey, we catch up with family stuff, and it is an entertaining journey. I rate it a 10. We tend to be punctual; they are more punctual than I am, but I am there between 6 am and 6.05 am.

If we arrive at that time, there are no parking problems, but it is impossible if we go an hour later. But since I usually go early, I have no problems, and I can leave it near the entrance door of the hospital. We park and get into the hospital without any problem. At that time there is no traffic on the road.

The journey of PB8 (Ap211-219)





The day before, I leave everything ready because otherwise, I would not arrive on time. I walk to the bus, 5 minutes (8). On my walk there, the sidewalks are fine, but there are no traffic lights. As a pedestrian, I feel safe but not so much as a driver. In terms of security, my neighbourhood, El Pomar, has a reputation for being unsafe, but at that time, 5 or 6 in the morning, there is no one to steal from...

I buy my transport card at the Metro Station. I always pay by card on the bus because I am aware of the prices if I pay by cash, which just throws you off! Also, payment by card is just so much easier and faster. This is nice because I travel by bus every day. If I could, however, I would travel by car because the bus is so expensive!

The bus is punctual, but the comfort depends on the type of bus. In the new ones, comfort is high, and information provided is good, but in the old ones, you are simply bouncing around in a smelly bus.

The last bit of my journey I do is by walking. It takes about 4 or 5 minutes at most. The bus leaves me very close. I never feel unsafe.

The journey of PB9 (Ap220-224)

I do not have to prepare much because I take the car parked three minutes away. Sometimes I take the bus. It depends on whether my husband needs the car. Either way, I feel comfortable. The only things that scare me are rats and the boars at Can Ruti! But the streets are safe, wide, and well-light.

The route is clear and well informed; the most difficult thing is ending up behind a bus because they drive slow!

The journey of PB10 (Ap224-232)

When I wake up, I check the weather app and get ready. I check the times on the day before; it is clear and easy. I leave my house; I have about 14 minutes walking fast to the train station because I live at the top of the town and the train is on the beach. I walk down, there is a bus, but I never catch it. I have no problem going very early because there is a train that leaves at 5:05 am, which I take when I go to work at 6:30 am. I buy a ticket from the machine and see if there are any delays. The journey is comfortable, and I feel safe. While waiting, I check my phone and listen to some music; I take advantage of the trip to relax.

If we talk about before the pandemic situation and working on weekends, then there was more problem at the train. The children were partying; they messed it up, people vomiting, etc. But during the week it does not happen because they are all workers. It was a bit complicated; I was cornered in an armchair waiting for them not to tell me anything so as not to mess it up.





Now, during the COVID-19, in the first confinement, I was fine because there was no one. But now there are very crowded trains again. Some trains do not pass, without warning, that is, they skipped a train, so the next one was very loaded. They have not added trains, so it depends on the time, it is very complicated.

The trains themselves are old and uncomfortable, but it depends on the train. The old ones have little space in them and look grungy. Sometimes it is delayed, but because I am so familiar with the route, it is okay. The final bit of the journey is comfortable; I have the last stop, so that is easy.

With many of the participants travelling to the same location, it is interesting to see the differences in their journey both practically and subjectively. When reading about their journeys, large differences in facilities (e.g., information, benches, quality of busses, access to transport card machines, etc.) can be seen. The location where the participants live and thus travel from and to has a notable impact on their travel experience.

5.3.6 Q6 What is the most important change that you would make?

"The buses could be improved. Recently I boarded a new one in which the information provided was very good; this is not the case with the other ones. Also, having the card included in a programme on your phone so that you can pay with your phone would be good. Now everything is still analogue." (BP1, Ap172). "I would put in a more suitable, direct bus route. There are so many stops for this bus; it goes all through neighbourhoods and has had changes to the route in the past years which I simply do not understand." (BP2, Ap180). "I would improve the ticket price and the arrival times of the buses. It is very expensive, and the app fails a lot." (BP4, Ap193). "I would like the bus departure to not be just at 2.00 pm. A bit more flexibility in departure would be nice." (BP5, Ap202-203). "The price is very, very, very expensive. Also, there is nothing at the stops. You have to travel for everything." (BP8, Ap219). "The RENFE trains, I add the issues about punctuality, frequency, and the need for cleaner and newer trains." (BP10, Ap232).

With the opportunity to think about what they would change, the participants mostly commented on price, availability and reliability. **This** is in line with the answers to the previous questions.





5.3.7 Q7 Which step in the journey made you feel most vulnerable and why?

Vulnerability during the trip is an important, influential factor of the experience. Many of the participants stated that this feeling is most apparent in the first or last mile. The former is the case for PB1 and BP8: "The last mile of the travel, I feel uncomfortable when I arrive at Can Ruti as I have to walk across the hospital car park to the entrance. It is freezing cold in winter and scary because people also sleep there." (BP1, Ap170). "On the return journey. On the way down (to the city, ed.), there are many visitors and people in the bus, making it overcrowded." (BP8, Ap218).

For others, it is mostly during the first mile. "When I go to the bus stop." (BP2, Ap179). "When I am waiting for the bus at the stop." (BP4, Ap192). "The first mile, while walking to the bus stop." (BP5, Ap201).

Then there is also a group that feels vulnerable in specific situations that often involve other people. "Depending on the people, I'm more nervous. It is not because of the bus or the street, it's really the people inside. Sometimes you think that at any moment they might pull a knife on you." (BP9, Ap223). "On weekends and at night because people are coming back from partying." (BP10, Ap231).

5.4 Summary of results

Due to the small sample size, it is not possible to generalize the results, meaning the experiences of the low-income women in this study do not necessarily reflect all low-income women in Barcelona. If referred to the low-income women in general, we are referring to participants in this study. Within this limitation, the results provide rich qualitative data expressing how low-income women experience their transport journeys.

5.4.1 Low-income women

Challenges

- **Exclusion due to finances does not limit their digital capabilities.**

Opportunities

- They often are **smartphone-dependent**. Often, they **don't have both a computer and a smartphone**. If they have to choose, they choose for a smartphone and use it also for actions you would otherwise use a computer for.





- The mode of travel matters. Most of the participants who **travel by public transport describe feelings of anxiety or even fear** when they know they will have to head out to travel. In contrast, those who **travel by car feel fine**.
- Lack of confidence in the public transportation system can cause anxiety and can be the result of unreliable travel time, punctuality or **being afraid that they will miss the bus stop** because it is not clearly indicated. Travel time: the same journey could take 7 minutes by car and 55 minutes by bus. This was perceived as very frustrated.
- For many participants, travelling by bus was **more the only choice than the preferred choice**. The most important reason for anxiety while travelling is perceived unsafety. Causes for this are **unsafe neighbourhoods, other passengers that are seen as untrustworthy, robbery and wild boars** in some locations. These feelings intensify during the night, especially for women. If they feel unsafe, they often state to **prefer to travel by car if they could afford it**.
- Several participants mentioned that the **price-quality balance is off**. They feel like they pay way too much for what they are getting in service. This also has to do with their low salaries. Too big of a portion of their salary is designated to bus travel to work.

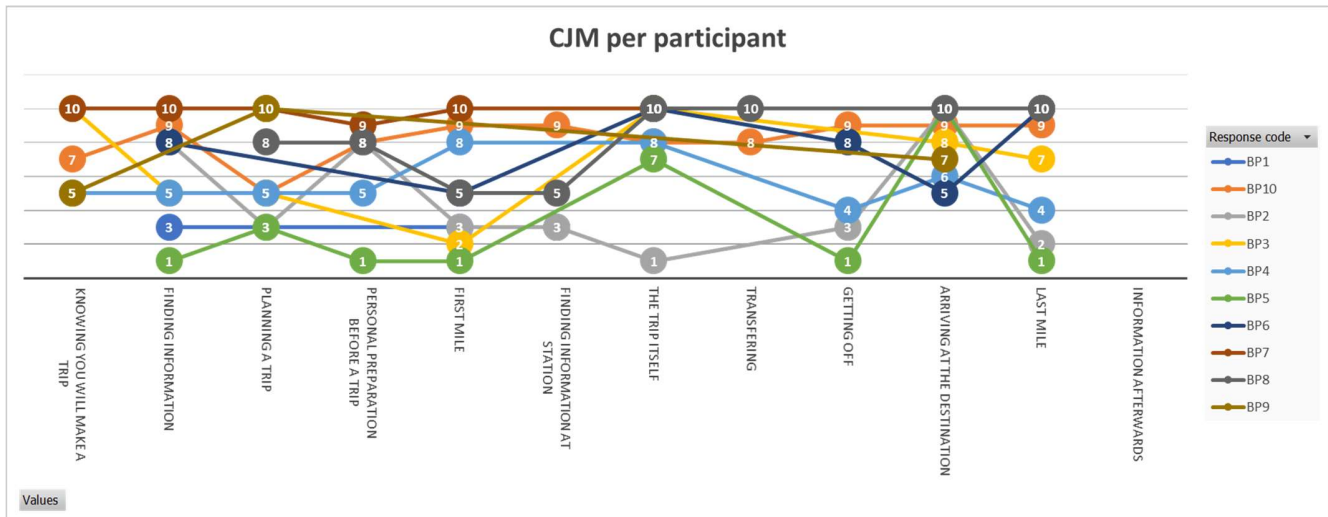
5.4.2 Illiterate Challenges

An illiterate woman **cannot read signs, information boards, websites or apps**. Therefore she **asks for directions from two or three people** because she does not trust the directions from just one person.



5.5 Customer Journey Map Barcelona

Graph 4 Customer Journey Map Barcelona (n=10)



If anything, the CJM of Barcelona, based on the experiences of the ten participants, shows that travel experiences can vary tremendously from individual to individual. This is something that also strongly came forth in the interview results of 5.3. Unfortunately, not all participants gave a definitive score when asked, meaning that some of the data in Graph 4 is missing. Although the CJM of the ten participants is highly different, some of the subjects do show noteworthy results.

Finding travel information is scored with a wide variance by the participants. Where for some it is no problem whatsoever, for others it is a very big limitation. What is noteworthy for research purposes is that their answers do not correspond with the survey scores to the answer "By using a computer, how confident are you that you can successfully plan an unfamiliar, local public transport journey?". BP3, for example, gave her confidence level a nine in the survey but found it difficult (5) to find information relating to her journey. This shows the importance of phrasing questions.

From the six participants who scored 'personal preparation before a trip', there is one who stands out amongst the rest. BP5, the oldest of the participants who also happens to be illiterate, scores this question with a decisive '1'. Her worry is that she will miss the bus in which case her husband will have to wait for her. "I have the feeling of stress at the time of departure because I have to get the bus. If I miss that one, I already have to wait 15 or 20 minutes, and I have my husband waiting." (BP5, Ap194). The combination of personal circumstances and her illiteracy – and therefore lack of information – leads to a worry



about missing the bus. This worry is also the argument behind the next lowest score for this question that PB4 gave.

Regarding the first mile of the journey, polarisation between the participants is shown. PB4, PB7, and PB10 have no issue with the first mile saying that "The journey is very comfortable and safe" (BP10, Ap227). BP7 also happens to be one of the participants who travel to work by car. At the other end of the spectrum, participants PB2, PB3, and PB5 do not at all feel comfortable during the first mile. For PB2, this is due to the environment through which she has to walk to get to the bus stop: "I have to walk through a wasteland at that time of the night, and you don't know who you might meet." (BP2, Ap175). For PB5, the reason is similar to her feelings towards her preparation, namely that she feels anxious about missing the bus. Interestingly, BP3 is one of the participants who travel to work by car. The low score that she gives to the first mile is due to the subjective discomfort from entering the carpark. "The kind of thing that everyone feels when they enter a car park..." (BP3, Ap182).

The trip itself is generally scored high, except PB2, who acts as a clear outlier in Graph 4 regarding this question. With her argumentation, she touches upon an important element of travel experience, the environmental qualities of the journey. Though highly subjective, a tedious or monotonous environment can influence the travel experience negatively, especially when this is combined with a long travel time.

Similar to the 'first mile', polarization can be observed between the seven participants who scored this question. For PB2, the length of the walk, in combination with a rather desolated environment through which this walk takes place, is reason to score this question with a '2'. The same argument is present in the answers of PB4 and PB5, who scored this question with a '4' and '1' respectively: "A 4 because of a long travel on foot and the presence of animals." (PB4, Ap191). The atmosphere of the surroundings of Can Ruti hospital is something that most participants mention as being not safe or comfortable.



6. Overview results

After analysing all 239 pages of transcripts, the following summary of results is presented in three parts. First, an overview is given per target group. The results are defined based upon opportunities, what solutions they found themselves to cope with these issues, and challenges, what kind of problems they face. The more detailed results are summarised below the table with corresponding keywords in bold. Second, there is a reflection of what the different target groups have in common and third, key overall findings are discussed. As always, with summarising, you erase details; these can still be found in the detailed results from the pilots and the transcripts.

6.1 Results Summary

Tabel 5 Summary overview.

Opportunities	Challenges
Elderly	
<ul style="list-style-type: none"> - Have more time - travel outside peak hours - Travel for leisure and family - No problem operating vending, check-in or payment machines. - Ask for help, but from family members - Some elderly have good digital capabilities 	<ul style="list-style-type: none"> - Insecure about their digital abilities: - Don't trust the information they find - Because they don't trust their abilities to find information online. - Use paper travel directions to always have the information at hand - Vulnerable to unexpected changes in travel directions - No restroom facilities are a reason not to travel - Need shelter from harsh weather - Find it hard to process apps, websites and signs with much information. - Sometimes, completely help dependent on their partner - Feel embarrassed when asking for help, besides their partners - Rely on family ties to plan trips - forgo a journey because it is too complex to figure out with public transportation

	<ul style="list-style-type: none"> - only appeal to help if it is really needed. - Online promotions are not successful
Low-income	
<ul style="list-style-type: none"> - High digital capabilities - Check fare prizes on forehand to feel secured 	<ul style="list-style-type: none"> - Smartphone dependent - Often no access to a computer - Only travel when necessary - Relay on discount tickets. - Cash payment is preferred over digital payment - Depend on Wi-Fi for internet while traveling - Exclusion due to finances does not limit their digital capabilities. - Perceived unsafety of public transport can cause anxiety and fear - Unreliable transport system due to punctuality, reliability or being hard to find. - Due to perceived unsafety, participants would stop travelling by bus if they had another option. - Unsafe neighbourhoods, untrustworthy passengers, robbery and wild boars are the main causes of unsafety. - Price quality balance is off in Barcelona
Wheelchair-bound	
<ul style="list-style-type: none"> - Good digital capabilities - Digital tools help them to move around 	<ul style="list-style-type: none"> - Bumpy pavement and poor infrastructure - Rather use tram than bus - Reliability is extremely important - Often a combination of challenges, old and low income - Rather not travel alone - felt like a second-class citizen or a burden to society
Blind/ bad eyesight	

<ul style="list-style-type: none"> - Screen reader compatibility is a must for travel apps. - Relay more on computers than smartphones due to readability. - Bigger fonts help visually impaired people 	<ul style="list-style-type: none"> - Avoid travelling to new locations if possible. Depending on family members when travelling to new locations. - Unhelpful bus drivers are problematic for visually impaired users who depend on them for information provision. - Not all websites and smartphones are screen reader compatible. - Fonts are often too small.
Deaf	
	<ul style="list-style-type: none"> - Invisible disabilities make people less compassionate and helpful.
Illiterate	
Ask several people for directions because they do not trust one answer	<ul style="list-style-type: none"> - Illiterate people cannot read signs, information boards, websites or apps.
Women	
<ul style="list-style-type: none"> - Tactics take the car, travel in groups, leaving early, streets with good lighting 	<ul style="list-style-type: none"> - All participants limited by safety are women. - 69% of the women felt limited due safety when travelling. 35% feel is very limited due to safety - Rather travel during the day - Female participants in Barcelona feel less safe than female participants in Tilburg, Flanders and Ancona. - Car drivers feel safer, but not everyone can afford it, making women's safety a social, economic problem.
What they have in common	
<ul style="list-style-type: none"> - Feel less embarrassed to ask family members for help - Make it very explicit that service is there to help them - Discount cards are effective 	<ul style="list-style-type: none"> - little to no trouble paying with cards and recharging them - People hate feeling embarrassed for their inability - People downplay their problems, especially elderly - Bus is perceived as transport for the poor



	<ul style="list-style-type: none">- All plan new trips upfront at home- Often struggle with understanding the boards and signs during the trip- elderly with low digital capabilities are more likely to use their phones than computers- shared mobility is marginal and is not seen as a solution
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Elderly

Opportunities

- Due to retirement, they **have more time**. They **travel outside of peak hours**, often for **leisure and family**.
- Elderly stated to **no difficulties operating ticket vending machines, paying with a transport card and checking in** at stations. In the beginning, they sometimes struggle to figure it out, but when they know it, they keep on using it.
- The elderly are resilient and can **ask for help**, but they need to feel comfortable doing so. If they ask for help, it is **often on family ties**.
- This group is diverse. **Some elderly have good digital capabilities** and are not help dependent. These are often elderly who perceive no financial limitations, which could be an indication that their **work before retirement has provided these digital capabilities**.
- **If they can afford it, they call a taxi** if they can't figure it out online
- In the case of the dial-a-bus, participants appreciated that they had to call the first time; they felt well helped and comfortable. **The dial a bus system is very successful for people with low digital capabilities**. Many rely on this system and have made use of it for many years. Even participants who know how to plan a trip online often prefer to keep using the phone service. This is a system that worked well for people with low digital capabilities.
- **Promotions** for services for people with low digital capabilities **spread through personal networks, flyers and promotions in a physical location**. Not through digital means. Showcasing the importance of offline promotions for services for vulnerable to exclusion groups due to digitalisation.





Challenges

- They are often **insecure about their digital abilities**. Even if they manage to find the correct information, they **don't trust this information** to be correct completely because they **doubt their ability to find it**.
- Often, they manage to find the information online and then **write the information down to be sure they have it at hand** when needed during the journey because they are insecure that they can find the information digitally on the spot. This can cause difficulties **when travel directions change** during the trip.
- Public **restroom facilities are very important** for the elderly. If these are not available, they consider not travelling by public transport at all if possible.
- In the colder countries, the elderly stated the importance of **shelter to protect them from harsh weather**.
- Elderly stated to have **difficulties processing much information** at the same time. Signs, websites and apps that show a lot of information at the same time are perceived as cluttered and not helpful. Having more information is not always better.
- Some elderly are **completely help dependent on their partners**. Their partner always does this for them, making them not develop digital travel skills. This makes them vulnerable to exclusion if they can't rely on their partner anymore.
- Some elderly **feel embarrassed when asking** for help from others besides their partner. If they do, they ask their children for help, but they don't want to burden them.
- They rarely ask for help when **planning a trip outside of their family ties** if they can not find the information themselves.
- Sometimes elderly **forgo a journey because it is too complex to figure out with public transportation**.
- Participants who do not have the digital capabilities to figure out a trip themselves also rarely travel to new locations. Even if they can ask for help from family members, this could indicate that they **only appeal to help if it is really needed**.
- **Online promotions** for services with low digital capabilities did not reach the participants. Showcasing that you cannot rely on online promotions for services for vulnerable to exclusion groups due to digitalisation.





Low-income

Opportunities

- **Exclusion due to finances does not limit their digital capabilities.**
- They **check fare prices beforehand** to shrink the chance of surprises and give them a feeling of security.

Challenges

- They often are **smartphone-dependent**. Often, they **don't have both a computer and a smartphone**. If they have to choose, they choose for a smartphone and use it also for actions you would otherwise use a computer for.
- Money is a limiting factor. They **only travel when necessary** and often **rely on discount tickets**. If these are not available, they make the decision not to make certain trips.
- **Cash payment is preferred over digital payment**, not due to lacking digital skills but because it is **easier to keep track of cash** and not be in a position where they have to pay more than they have.
- They often **depend on Wi-Fi** for the internet during their journey. If they need internet because the trip changes during the journey, they rather ask for help than use calling credit.
- The mode of travel matters. Some female participants in Barcelona who **travel by public transport describe feelings of anxiety or even fear** when they know they will have to head out to travel. In contrast, those who **travel by car feel fine**.
- Lack of confidence in the public transportation system can cause anxiety and can result from unreliable travel times, punctuality or **being afraid that they will miss the bus stop** because it is not clearly indicated. Travel time: the same journey could take 7 minutes by car and 55 minutes by bus. This was perceived as very frustrating.
- For many participants, travelling by bus was **more the only choice than the preferred choice**. The most important reason for anxiety while travelling is perceived unsafety. Causes for this are **unsafe neighbourhoods, other passengers that are seen as untrustworthy, robbery and wild boars** in some locations. These feelings intensify during the night, especially for women. If they feel unsafe, they often state to **prefer to travel by car if they could afford it**.
- Several participants mentioned that the **price-quality balance is off**. They feel like they pay way too much for what they are getting in service. This also has to do





with their low salaries. Too big of a portion of their salary is designated to bus travel to work.

Wheelchair

Possibilities

- Often **good digital capabilities** because they **depend on apps and online information to travel around**.

Challenges

- **Bumpy pavement** is still a problem in the pilot cities. One participant was thrown out of her wheelchair due to a gap in the pavement. Poor infrastructure makes not all bus stops accessible to them.
- Participants in wheelchairs **rather use the tram than the bus**. The reason is that the tram is easy to access because it is standing on rails, it is often close to the tram platform, and they always take the same route making the direction **reliable and predictable**. This reassures them that they can also get out of the vehicle.
- Participants in wheelchairs often have a **combination of challenges**. They are more likely to be **old** due to their **ageing bodies** or **lower-income** since people in wheelchairs are less likely to find (well paying) jobs.
- Participants in wheelchairs **rather not travel alone** but often have to because no one is available.

A woman in a wheelchair stated "I **felt like a second-class citizen or a burden to society**"

Blind/ bad eyesight

Opportunities

- **Screen readers helped** the participants **to find their way online**.
- **Computers with lenses, big fonts, and big screens** helped a participant with bad eyesight find her way online. These are **functionalities that smartphones can't offer**.
- **Bigger fonts in the app** and at the **bus stop help visually impaired** travellers.

Challenges





- Travelling to **new locations** is something they try to **avoid** if possible. In these cases, they often ask for help from **family members** to drive them if possible.
- **Not all websites and apps are compatible with screen readers** causing the exclusion of visually impaired people.
- In Ancona, **less than half** (5/11) of the participants perceived the **bus drivers as friendly and helpful** most of the time. This is especially an issue for visually impaired users since they can't see the **information displayed** at the bus stop or on the bus itself and **depend** on them.

Deaf

Challenges

- Fellow passengers are **not always compassionate** or patient with invisible disabilities. They don't feel the need to give them their seat or be of help. A participant stated not to use the bus for a while after this incident.

Illiterate

Challenges

- An illiterate woman **cannot read signs, information boards, websites or apps**. Therefore, she **asks for directions from two or three people** because she does not trust the directions from just one person.

Women

Opportunities

- Women reported the following tactics to feel safer; **Taking the car, travelling in groups, leaving early**, or choose routes with **good lighting**

Challenges

- **All participants who perceive safety as very limiting are women**. 72% of the participants are female, 69% of the women in this sample feel limited due to safety. Half of them (35%) feels very limited due to safety.
- Most participants walk the last mile. **Female participants rather do this during the day due to perceived safety**. For **only one male**, this was mentioned as important.





- **Safety is relative and location dependent.** In Tilburg and Flanders, participants only mentioned feeling unsafe due to the behaviour of the bus driver. In Ancona, the bus driver is not always friendly, but not why they feel unsafe; for them it's certain streets. In Barcelona, women often feel unsafe on the streets, on their way to work and in the bus
- If feeling unsafe, women strongly **prefer using the car**. However, quite some low-income participants **cannot afford this**, making this also a social, economic problem. **Low-income women are more likely to be at risk.**

6.2 What they have in common

After reading all the stories, commonalities can be found. A very human thing to experience and to feel is that people **hate to be embarrassed by their inability**. Elderly find it difficult to ask for help outside of their closest support structure. People with low income get nervous when entering the bus, being afraid there is not enough money on their cards. TP5, who is in a wheelchair, experienced embarrassment when someone did not get out of the wheelchair spot. The bus driver corrected the other passenger, but she still felt embarrassed even though she was in her full right. There is not a single thing people remember better than experiences of embarrassment and this is something these people are dealing with regularly. People dislike being in the spotlight due to their special needs. Whether this is because they are in a wheelchair, do not have sufficient credit, or simply because they help with a digital tool is irrelevant.

People seem **less likely** to be **embarrassed** if they ask for help **from someone they love** or **make it explicitly clear that they are there to help them**. As mentioned, a good example is the dial-a-bus: people have to call the first time, and after feeling well assisted, they will call again when needed. Also, because this is organised very locally, there are not that many users, so the person on the other side of the line will know the users in the long run. This creates trust. The personal approach works. This is different from a Dutch elderly who does not call the service desk because he would feel embarrassed.

Most **elderly** participants '**downplayed**' the **problems** they experienced by stating that they are old and probably not as accustomed to the digital information provision. As if it is their fault that something went wrong. Also, elderly in Tilburg and in Flanders indicated that costs is not a big limitation for them due to having an **elderly discount. This seems to be very effective.**

The **perception** of the bus as being the **vehicle of the poor** still plays a role for some people. TP8I said that she usually avoids taking the bus; "I always find people who travel by bus a bit sad. Packed like sardines, stopping so often." (TP8I, Ap88) This – mostly





culturally based – opinion leads to her usually travelling individually, mostly by car. Also, in Barcelona, women who feel unsafe expressed wishes to drive if they could afford it.

Participants seem to have **little to no trouble paying with cards and recharging them** both on the bus and at ticket machines. How exactly these worked could have been clearer at the beginning, but in the end, everything was figured out without any problems. If they have the card and know how to use it, they keep using it without face problems. **Getting started is the challenge.**

All participants **plan new trips upfront** and need little information during the journey. When they do, they often **struggle** to find the information due to the **amount of info on the signs**. Vehicles and signs only showing the final destination and routing that looks clear but are not always clear when they need it.

There is a high awareness of their surroundings and thereby the risk of confusion as soon as something changes can be perceived at the larger stations. Signage was named as a clear and helpful tool. Like with signs with too much info, elderly mention confusion when they arrive at big train stations with too many options and incentives. These are also situations in which they are more likely to make mistakes like checking out and in again when they leave the bus/train. Both elderly and low-income focus on signage when they arrive at a new station, which often works well if the signing is clear. This also includes geographical signing: where is the city centre, which street is at which exit from the station, etc.

People with low income and **elderly with low digital capabilities are more likely to use their phones than computers**. Focusing on mobile applications rather than websites seem to reach a wider audience. For example, someone indicated that she would like to get a text confirmation for the dial-a-bus because she does not know how to use email but do knows how to use text.

Shared mobility or digital taxi services seem to play no significant role for these people. Only one participant made often use of these services. Most of them have never used them. This shows that stimulating sharing services is not directly limiting perceived exclusion. Especially since the people who feel most excluded are the less likely ones to use them.

6.3 Future research opportunities

- Low incomes might have limited access to a laptop and a smartphone. This does not necessarily say something about their technical abilities but rather their financial capacities. This seems the case in Tilburg and Ancona. Qualitative analysis between





the income and having both a laptop and a computer is recommended to specify this parameter.

- Low income might be under-reported. People who have a low income do not always perceive it like that because they travel less. This might say something about the financial ability to travel rather than the will to travel. Comparative qualitative analysis is recommended to see if participants who are very similar to the low-income group but with higher financial capabilities report the same travel behaviour.
- In Tilburg, the low-income group gave themselves lower digital confidence scores than the elderly. This might have to do with self-confidence rather than confidence in their digital abilities. Comparative qualitative analysis is recommended to see if participants who are very similar to the low-income group but with higher confidence levels and income might correlate with the confidence level.
- Availability and infrastructure were graded lower by the low-income groups than for the elderly. This also seems to be the case in Barcelona. This could indicate that this is either due to their geographical locations' infrastructure and availability or perception of what is good infrastructure and availability. Comparing zip codes and perception of availability and infrastructure might indicate which locations need more attention.
- The majority of the participants seem to have a fallback person to help them out. This usually happens to be a relative. It seems to reduce their perception of being excluded significantly. It might be worth using multilinear regression to see if there is a mitigating effect and how big it is.
- In Tilburg, none of the participants expressed problems or difficulties regarding trip-planning. All seem digital able and can book trips individually. Comparing services with other countries might indicate if this is due to having accessible services or if being more digital is cultural.
- Noteworthy is that several participants reported very high digital capability (9) but still struggle with digital aspects during their journey, especially new ones. This indicates that there is often an overstating confidence bias. Qualitative analysis with the survey results is advised to check if there is a big gap between state confidence and the ability to performing a task involving a digital aspect.
- When asked about perceived safety, scores were often high. But during the interview, several participants mentioned moments of feeling unsafe in the dark, also the ones who stated to see this as no limitation. For future surveys, it might be interesting to ask them about their general perceived safety and their safety at night since the latter might be underreported.





- First contact seems to be very important for the willingness to help in the future. TP3E stated when asked whether he calls the NS service desk when needed: "Oh no, no. I have very poor experiences with them, I must say. I had the idea that I was hopelessly embarrassing those people with my unclarities." (TP3E, Ap33). This might hint at a fear of being perceived as 'obtrusive' or 'assertive'. This is different for the dial-a-bus in Flanders. All participants stated to be very well helped the first time, and they prefer to keep using it in the future. Some for over 11 years. They also state to feel fine and not embarrassed when calling for help. Experiments with the dial-a-bus approach for other service providers might be very successful.
- Accessible toilets are important for elderly at stops as are places to sit. This corresponds with the needs of elderly in Flanders. Also, shelter with bad weather is deeply appreciated. An interesting research proposal is to, use transport card- or senior pass data to find the most important bus stops for the elderly, and improve the facilities at these stops with priority.





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