PERCEIVED ACCESSIBILITY

VIEWING ACCESSIBILITY THROUGH THE EYES OF SENIORS IN APELDOORN

Eva Rispens
Master's thesis for the Spatial Planning Programme
Faculty of Management
Radboud University Nijmegen
October 2019

Perceived Accessibility

Viewing accessibility through the eyes of seniors in Apeldoorn

Author	: Eva Rispens
Student number	: s4383370
Date:	: October 2019
Institution	: Radboud University Nijmegen
Faculty	: Faculty of Management
Programme	: Master of Spatial Planning
Specialisation	: Urban and Regional Mobility
Radboud University supervisor	: Dr. S. Lenferink
Internship institution	: Municipality of Apeldoorn
Supervisors internship	: B. De Leeuw
	: T. Thissen
Word count	: 28.544 (Excluding Abstract, Preface, Content pages, References and Appendices)

Radboud Universiteit

Apeldoorn

Abstract

People inevitably become less mobile as they grow older, which influences their mobility as well as their accessibility overall. In Apeldoorn, the population of seniors is fast growing, which produces new challenges for the municipality as they wish to keep all of their citizens included in society. When planning for accessibility, it is important to keep in mind the needs and wishes of those you are planning for. Research has concluded that experts prioritise different needs for seniors than seniors do for themselves, indicating that seniors are not fully understood in what they want and need. Using the experiences and perceptions of seniors, this study has explored those preferences, wishes and their abilities to gain an understanding of which indicators are actually important to seniors when thinking about the accessibility of a location. At the end of this research it has become clear that seniors in Apeldoorn are predominantly positive about their own accessibility. This positivity is first of all derived from seniors being able to switch between modes of transport, to avoid specific individual, activity and transportation barriers. Secondly, seniors tend to accept that their world becomes smaller when some barriers cannot be overcome. As a result, they perceive their accessibility as positive, even when their world has become smaller. This study concludes that additional to Activity and Transportation Factors, Personal Factors have a great influence on the way seniors perceive their accessibility. Moreover, seniors value specific indicators as more than other indicators, suggesting that seniors indeed experience accessibility different from other population groups. The indicators that have come forward as important do not only influence the perceived accessibility directly, but are interconnected. Some indicators strengthen each other's influence on the experience of seniors while other indicators weaken each other's' importance on the perception of accessibility.

Keywords: Perceived accessibility, Seniors, Mode of Transport, Indicators

Acknowledgements

In front of you, you see my Master thesis that forms the final product of my master Spatial Planning with the specialization 'Urban and Regional Mobility'. This thesis forms the conclusion of six years in Nijmegen in which I have studied the ins and outs of spatial planning, only to understand that there is so much I still have to learn.

Throughout the process of writing my thesis, I have received a great deal of help that I would like to thank for their time and patience. First of all, my supervisor Sander Lenferink, who gave me the confidence I needed to pursue my own ideas of this research topic and took his time to guide me through these eight months of hard work. Secondly, my collaboration with the municipality of Apeldoorn has presented me with two supervisors who not only had my back, but gave me a glimpse of the complex and interconnected field I want to work in. I would like to thank Bert de Leeuw and Twan Thissen for their trust in me taking this internship and for the great atmosphere at the office during my stay.

Furthermore I would like to express my sincere gratitude to all my friends and family who supported me, encouraged me and who kept me motivated to keep going. At last, I would like to single out my mother, who sat with me during long nights, sparred with me for hours and hours and without whom, I would not have gotten where I am now.

I hope you enjoy reading my master thesis,

Eva Rispens

October 2019

List of Figures

Figure 1: Relationships between components of accessibility. Source: Geurs & van Wee, 2004, p.129

Figure 2: Conceptual model. Source: own design, 2019

Figure 3: The research design. Source: own design. 2019

Figure 4: New conceptual model. Source: own design. 2019

List of Maps:

Map 1: The neighbourhood of Orden including important destination. Source: Blokplan, 2019.

Map 2: The neighbourhood of Berg en Bos including important destinations. Source: Blokplan, 2019.

List of Tables

Table 1: Activity Factors of Accessibility. Source: Handy & Clifton, 2001.

Table 2: Transportation Factors of Accessibility. Source: Handy & Clifton, 2001.

Table 3: Mobility barriers for seniors based on importance by seniors and experts. Source: Risser et al., 2010.

Table 4: Categorisation of barriers by Risser et al., 2010 to the factors of Handy & Clifton, 2001.

Table 5: New categorisation of barriers by Risser et al., 2010 to the adjusted factors of Handy & Clifton, 2001.

Table 6: Adjusted Activity Factors by Handy and Clifton, 2001 with their influence and respective accessibility components by Geurs and van Wee, 2004. Source: own design, 2019.

Table 7: Adjusted Transportation Factors by Handy and Clifton, 2001, with their influence and respective accessibility components by Geurs & van Wee, 2004. Source: own design, 2019

Table 8: Personal Factors, with their influence and respective accessibility components by Geurs & van Wee, 2004. Source: own design, 2019

Contents

Chapter 1: Introduction 9
1.1. Problem statement 9
1.2. Aim and Questions 11
1.3. Societal- and Scientific Relevance 11
1.4. Reading guide 13
Chapter 2: Theoretical framework 14
2.1. Accessibility 14
2.1.1. Mobility, Accessibility and Perceived Accessibility 14
2.1.2. Components of accessibility 15
2.1.3. Perspectives on accessibility 16
2.1.4. Perceived accessibility factors 18
2.1.5. Perceived barriers 20
2.2. Conceptual model 23
2.3. Operationalisation 24
Chapter 3: Methodology 25
3.1. Research philosophy 25
3.2. Research approach and strategy 26
3.3. Data collection and analyses 28
3.4. Reliability, Validity and Generalizability 31
3.5. Research design 33
Chapter 4: Results 34
4.1. Case descriptions and Destinations 34
4.2. Activity Factors 38
4.2.1. Related to Activity 38
4.2.2. Related to Design 39
4.3. Transportation Factors 40
4.3.1. Impedance Factors 40
4.3.2. Level-of-Service Factors 41
4.3.3. Terminal Factors 43
4.3.4. Comfort Factors 44
4.4. Personal Factors 45
4.4.1. Health 45
4.4.2. Social Network 47
4.5. Synthesis 49
Chapter 5: Conclusion 53

5.1. Sub conclusions 53
5.2. Conclusion 56
Chapter 6: Recommendations and reflection 58
6.1. Recommendations 58
6.1.1. Recommendations for future research 58
6.1.2. Recommendations for the Municipality of Apeldoorn 59
6.2. Critical Reflection 60
References 63
Appendices 67
Appendix 1: Operationalisation of Activity factors 68
Appendix 2: Operationalisation of Transportation factors 69
Appendix 3: Operationalisation of Personal Factors 71
Appendix 4: Heat map of seniors living in Apeldoorn 72
Appendix 5: List of respondents 73
Appendix 6: Interview guide 74
Appendix 7: Mental maps 77
Appendix 8: Code scheme 84
Appendix 9: Dutch abstract 88

Chapter 1: Introduction

1.1. Problem statement

By 2040, over 26 percent of the population in The Netherlands will be 65 years or older (Stoeldraaijer, van Duin & Huisman, 2017). This process, in which the demographic structure of the total population is aging, is known as 'the greying of society'. This demographic change has an extensive impact on how the current Dutch pension system is structured, how health care systems need to adapt to these increasing numbers and how we can keep older citizens active in society (Ekamper & Nimwegen, 2018; Nationale Zorggids, 2019). As people age, their health and consequently their mobility declines, which decreases people's ability to participate in society (Centraal bureau voor de Statistiek (CBS), 2004; Coughlin, 2001; Risser, Haindl & Stahl, 2010). This increasingly happens at a later age because the health care system can treat more illnesses and people take on a healthier lifestyle overall (Van Duin & Stoeldraijer, 2014). Nevertheless, people from the age of 75 experience a gradual decrease in their health, especially in their mobility (Centraal Bureau voor de Statistiek, 2014). Up to 30 years ago, seniors were able to move to a nursing home when their needs increased, however due to increasing healthcare costs, the Dutch government has started the transition to a healthcare system in which seniors remain living in their own homes, with possible adaptations to those homes (Ministerie van Volksgezondheid, Welzijn en Sport, 2018).

Risser et al. (2010) explain that age itself contributes to the decrease of mobility among seniors, a decrease in health also influences how people perceive the world around them, which further decrease one's ability to travel. The CROW, a knowledge institute for infrastructure in the Netherlands, has identified three types of health deterioration among seniors: (1) their ability to execute actions, (2) their observation skills and (3) their ability to make decisions (CROW, 2011). An example of this influence is the traffic environment seniors navigate through, which influences the physical surroundings (busy roads, rush, narrow sidewalks, too short green lights) as well as the psychological surroundings (other users in a hurry, feeling of safety). The travel environment is often fast and complex, and as seniors become less able to navigate through them, they can become insecure about their own capabilities and the potential to get injured (Risser et al., 2010).

To gain an insight into how people (such as senior citizens) can remain mobile and stay active participants of society, one can look at their mobility and accessibility to places they wish to go. Both these concepts are a vital part of urban planning, but they are not the same. Handy (2005) explains that these terms are used together very often, both in science and policy making, but they commit to different goals. When planning for mobility, you enhance a person's ability to travel from one place to the other (Hansen, 1959). One can think of increasing the capacity of a road to speed up traffic and the amount of traffic that can pass, making it easier for people to traverse a distance. Handy (2002) emphasizes the difference of this concept with the concept of accessibility, which can be described as 'the potential for interaction.' (Hansen, 1959). This potential for interaction concerns much more than traveling from point A to B (which is what mobility is all about). Rather, accessibility concerns the connection between people, land and their potential to perform interactions. Hansen (1959) also points to the vital importance of accessibility for people, as without it, they cannot interact with society or with other people.

The advantages of planning for accessibility become clear through the following example set by De Leeuw, expert on traffic and infrastructure planning at the municipality of Apeldoorn: "When planning for mobility in a desert, one will be able to travel greater distance within an hour, but still be in a desert

with no destination to travel to. When planning for accessibility, one may be able to travel less far, but will have ensured there is an oasis at the end of the road: planning not for speed or distance, but for a destination." (Personal communication, January 30, 2019).

As Pirie (1978) once said: "There is scarcely a book or paper on urban and regional affairs that does not allude the notion of accessibility in one way or the other". Planning for accessibility has gained popularity among urban planners and there are several ways to gain an understanding of the accessibility of an area (Pirie, 1978). The CROW uses three quantitative indicators to determine the accessibility of places: (1) proximity to the location, (2) speed of travel and (3) the possibility to use different modes of transport (Planbureau voor de Leefomgeving, 2016). By applying these three indicators the CROW determines the accessibility of places in The Netherlands and creates a representation of what the 'objective' or 'real' accessibility of a location is. Additionally, officials from Dutch municipalities can also monitor the accessibility of their respective city on a local scale. For example, the city of Apeldoorn performs the accessibility assessment differently as opposed to the CROW: employing the opinions of its citizens, Apeldoorn charts the perception of its citizens regarding the accessibility of their city, thereby gaining insight into the more 'subjective' side of accessibility. Every two years, the municipality measures the accessibility satisfaction through a survey with over 1000 participants in a population monitor (Heirbaut & Visser, 2017).

Handy and Clifton (2001) have made a global inventory of factors that influence the perceived accessibility within a neighbourhood, per mode of transport. Their framework contains many indicators based on Activity and Transportation factors, which together explain how a person experiences the accessibility within a specific neighbourhood. In the research, Activity Factors contribute to the attractiveness of an activity and the Transportation Factors contribute to the ability of an individual to get to these activities. In the line of perceived accessibility, Risser et al. (2010) have concluded that the process of aging has a strong influence on these indicators, and thus different age groups perceive these indicators differently: Seniors perceive accessibility from younger people. Considering this, the accessibility assessment of the municipality of Apeldoorn shows a shifted satisfaction of its citizens, because the data of all population groups has been gathered together, cancelling out the differences between age groups (Heirbaut & Visser, 2017). Some areas may be determined as highly accessible for the average citizen of Apeldoorn, but a senior may perceive these locations as inaccessible. It might withhold them from interacting with others and therefore disconnecting them from society. Considering the current projection for the senior population of Apeldoorn, which is expected to increase by 47% by 2040, Apeldoorn will become one of the most 'grey' cities in the Netherlands (Heirbaut & Visser, 2017).

As part of its vision of becoming a family oriented city, the municipality of Apeldoorn has the ambition to include its seniors more in society (Gemeente Apeldoorn, 2018). As of yet, it is expected that more of these seniors will be scattered over the city in their own homes, rather than concentrated in nursing homes, which makes it a complicated challenge for the municipality to meet the needs and wants of these seniors. Moreover, before this ambition can become a reality, it is crucial to gain an understanding on what the needs and wants of these seniors are. Understanding how seniors perceive their own accessibility and which indicators play a role in creating this perception is necessary to overcome the barriers they face and to stimulate the trips they do wish to make.

1.2. Aim and Questions

The introduction indicates that seniors experience a decline in their potential to interact and their access to society. The city of Apeldoorn wants to boost this potential for interaction, but while there has been done much research on possible indicators that may influence the perception of accessibility, only few researchers have focused their work on seniors as a distinct population. Therefore, this research will explore the perceived accessibility of senior citizens, with the following aim:

To contribute to the knowledge of the municipality of Apeldoorn on how to plan for accessibility in the public space for senior citizens living at home in the city of Apeldoorn, by gaining an understanding which factors influence their perception of accessibility.

In order to meet this aim, this research has been divided into two parts: (1) a literature study to determine relevant concepts and influencing factors of perceived accessibility of seniors and (2) an exploratory case study to understand how seniors in Apeldoorn experience their accessibility and to discover additional factors that influence their perceived accessibility. Therefore, the following question will be asked throughout this research:

How do seniors in Apeldoorn experience their accessibility and which factors influence this perception of accessibility?

To support the main question, the following sub questions have been stated:

(1) Which facilities and destinations are important to seniors?
(2) What role do Activity factors play in the perceived accessibility of seniors?
(3) What role do Transportation factors play in the perceived accessibility of seniors?

1.3. Societal- and Scientific Relevance

Societal Relevance

Since the 1980's, the Dutch government has been supporting seniors to keep living in their own homes, rather than moving into a nursing home (Ministerie van Volksgezondheid, Welzijn en Sport, 2018). As the senior population will continue to grow until 2060, the Dutch government has created stricter admission rules for persons wanting to move into these nursing homes (De Monitor, 2017). The main reasons for this restriction are the increasing costs related to the expanding senior population as well as the lack of staff in these nursing homes that would be unable to keep up with the rising demand. In different layers of the government, projects and initiatives are established to adapt the homes of seniors to their increasing needs (Ministerie van Volksgezondheid, Welzijn en Sport, 2018).

Even though the government is supporting adaptations to the homes of the senior population, this does not automatically indicate that a senior is able to remain connected to society: while their house remains accessible, the space that connects them to others and potential activities may not be. External influences play a part in the way seniors perceive the space that both connects but also separates them

(Alsnih & Hensher, 2003; Handy and Clifton, 2001; Risser et al., 2010). In his research, Coughlin (2001) expresses the need for municipalities to enhance their public policy to aid seniors who still live independently especially because their ability to access activities becomes more limited as people grow older and their health limits their freedom of movement. Municipalities look at the general accessibility of their citizens, rather than through the eyes of specific population groups such as seniors (Personal communication, B. de Leeuw, January 30, 2019). Therefore, the current knowledge on what seniors perceive as important and which indicators play a role in their accessibility of the public space, is lacking.

This research contributes to an understanding of how seniors perceive their accessibility by making an inventory of the factors and indicators that contribute to their perception of accessibility in the public space that connects them to society. It will set a basis for the policy-making of municipalities that wish to enhance their public space to the need and preferences of their growing senior population. This will allow municipalities to adapt their current policies with more accuracy to indicators that are lacking in certain areas to increase the accessibility of public space for seniors.

Scientific Relevance

Over the last decade, many scientific papers addressed the urgency for governments to look into the mobility needs of senior citizens (Alsnih & Hensher, 2003; Coughlin, 2001; Risser et al., 2010; Whelan Langford, Oxley, Koppel & Charlton, 2006). The common theme of these studies concerns the increasing car use among senior citizens, how this might influence the current transport system and examined whether governments should adapt their transport system to this increase. The reason given for this specific focus on car use, relates to the relative ease with which it can be researched: Iacono, Krizek & El-Geneidy (2010) explain that other forms of non-motorised transport are much harder to analyse because data on these modes of transport are unavailable, unlike car use data.

While most of these scientific papers have focused on the mobility limitations seniors will face and how this will affect a senior's ability to participate in society, only very few researchers examine how accessibility is perceived. Iacono et al. (2010) describe that not just quantitative data from specific modes of transport are complicated to obtain, but also qualitative data on how people perceive something is often problematic to obtain. It requires extensive data collections and have little generalisation value as opinions to accessibility are highly location bound (Handy & Clifton, 2001). Research on the subjective factors of accessibility is therefore less advanced compared to the more objective factors.

Handy and Clifton (2001) have created a basis of research concerning the perceived accessibility and which factors contribute to it, on neighbourhood level. There are two types of factors included: (1) Activity factors, which look at the attractiveness of a location or activity and (2) Transportation factors, which contribute to the ability to get to a location or activity. This knowledge is limited to the general perception of a citizen from that neighbourhood, but is a starting point for further research towards more specific population groups within such a neighbourhood. Risser et al. (2010) did focus their research on the specific population group of seniors. Their research indicates limitations in the research of Handy and Clifton (2001) who do not incorporate any personal influences on perceived accessibility while Risser et al. (2010) have found barriers based on these Personal Factors.

This research will build further on these two studies of Handy and Clifton (2001) and Risser et al. (2010) by reducing the knowledge deficit on the perceived accessibility of seniors. In the process of doing so, it will seek to better understand the influence of each of the overarching factors by Handy and Clifton (2001) and its influence on the perceived accessibility of a senior. Most importantly, this research will pursue the understanding of a not yet incorporated influence: the Personal Factors, and its influence

on perceived accessibility of seniors (this concept will be further elaborated in chapter 2). In doing so, this research will explore a potential difference in the way seniors and other population groups experience accessibility. A new discussion is opened up whether personal characteristics of people should be included in the research of accessibility among different population groups. This will furthermore contribute to the general knowledge of subjective accessibility on which indicators of the public space are specifically more or less imperative to seniors and their ability to connect to society.

1.4. Reading guide

The remainder of this thesis is structured as follows: The second chapter discusses the theoretical framework that is used for this research to answer the research question. The third chapter describes the methodological strategy, data collection method and the way in which the analysis of the data is conducted. The fourth chapter discusses the results of the analysis. Each case will be elaborated shortly with its characteristics prior to this analysis. The final chapter will function as a conclusion of this research in which the research question is answered. Following the conclusion of this research, recommendations for future research will be given and this chapter will close with a reflection on this research overall.

Chapter 2: Theoretical framework

This chapter will scrutinise the theoretical framework that has been used to perform this research. First, the concepts of mobility, accessibility and perceived accessibility will be addressed shortly to gain a basic understanding on their relations and differences. Continuing with the concept of accessibility in more detail, its four components and four main perspectives will be explained. Based on one of these perspectives, specific factors important to this research will be elaborated and critically assessed by comparing them to barriers that are perceived in accessibility, specifically by seniors. This assessment demonstrates a knowledge deficit in the current literature, for which a new factor is introduced to overcome this deficit. This chapter will conclude with a conceptual model of the theoretical framework and its operationalisation.

2.1. Accessibility

2.1.1. Mobility, Accessibility and Perceived Accessibility

Handy (2005) starts her paper by explaining that much policy has been written with the goals to increase the accessibility and mobility of locations, but that the writers of this policy often do not seem to understand the difference between these two concepts. It is therefore important to first understand the basics of these two concepts in order to continue with theory on accessibility.

Mobility

The concept of mobility has always been part of urban planning, long before accessibility made its appearance 50 years ago (El-Geneidy & Levinson, 2006). Hansen (1959) explains mobility as the ability to travel from one place to another. Handy (2005) defines this concept slightly different, emphasising the ease at which an individual has the potential to move between point A and B. At last, Martens (2012) differentiates the concept between 'the potential mobility' and 'mobility'. He (Martens, 2012) explains that the first concept equals the freedom of movement, indicating the full potential of for example a highway. The second concept refers to the degree to which this potential is being used: the actual mobility is often lower than the potential mobility, which suggests for example that the highway is not being used to its full capacity. According to Handy (2005) planning for mobility results into easier travel. She emphasises that in practice, it becomes easier to travel around by car, especially in the United States. The downside in planning for mobility is, that it eventually leads to the need for more mobility planning, creating a vicious cycle: Planning for mobility eases travelling, making it more attractive to travel, hence increasing travel, which leads to increasing congestion, which will be followed by new need to plan for mobility.

Objective Accessibility

As mobility makes it easier to travel, accessibility makes it easier to travel where you need to travel to (Handy, 2005). An example would be a highway in the middle of the desert: granting high mobility, but without destination no accessibility (Personal communication, B. de Leeuw, April 1, 2019). Accessibility is based on the spatial distributed activities an individual can participate in, based on their abilities, needs and desires (Hansen, 1959). This description of accessibility is vague and can be interpreted in different ways. It can be related to many aspects of social life influencing them one way or another. Accessibility is associated with higher levels of productivity (Condeço-Melhorado, Reggiani & Gutiérrez, 2014), better life quality and health (Whelan et al., 2006) and freedom of choice (Burns, 1979). There are thus different perspectives on accessibility (which will be further elaborated in paragraph 2.3.) which can be used at different levels (local, regional, national or even international) and by different

modes of transport. Planning for accessibility allows planners to break through the vicious cycle of mobility planning, by planning in such as way the need to travel is reduced, instead of making it easier. Accessibility can be measured by planners to calculate the accessibility of specific locations, indicating the potential accessibility. In practice, these measures use quantitative data, using objective factors to do so (Geurs & Van Wee, 2004; Handy & Clifton, 2001). They deal with certain predetermined aspects of travel (Lätman, Olssen & Friman, 2016) as the data on these aspects are easier obtained and interpreted by planners (Iacono et al., 2010).

Subjective Accessibility

While objective accessibility deals with predetermined factors of transport, it does not consider whether these factors are deemed important by the travellers using the transport (Lättman et al., 2016). By definition of Hansen (1959), the needs and preferences of individuals are often left out of the measurement of accessibility. Lättman et al. (2016) have defined perceived accessibility as "the ease by which a person can live a satisfactory life using the transport system". This definition emphasises the experiences of users and how they assess their own accessibility. Lättman et al. (2016) have concluded that, in order to increase accessibility overall, one should evaluate how travellers perceive the transport system they can benefit from. Lofti & Koohsari (2009) have found that an objective measure can conclude that an area is poorly accessible, whereas residents of this area perceive it as adequate. Some studies do focus on the perceived accessibility on the basis of demographic characteristics while few other use non-quantifiable methods such as interviews (Curl, Nelson & Anable, 2011). Yet, when planning for accessibility, governments rarely include this subjective side together with the objective side. This is a result of the lack of knowledge on perceived accessibility in general, but also the difficulty by which data on this can be collected (Handy and Clifton, 2001) and its difficulty to interpret and use in actual policymaking (Iacono et al., 2010)

2.1.2. Components of accessibility

As already explained above, the concept of accessibility is broad and can be interpreted in different ways. Based on the definition of Hansen (1959) and supplemented by other definitions of researchers, Geurs and Van Wee (2004) created the following comprehensive definition: "Accessibility measures are seen as indications for the impact of land-use and transport developments and policy plans on the functioning of the society in general" (p. 128). Their definition emphasizes that accessibility indeed has a crucial impact on society. Geurs and van Wee (2004) have categorised four components based on their definition that form the core of what accessibility stands for: (1) land-use, (2) transportation, (3) temporal and (4) individual. These components influence each other and together influence accessibility, and thus society (see figure 1).

The first component of accessibility is *land use*. Land use is the overall process of regulating the use of land. Based on how land is used, more or less activities can take place at a specific location and this spatial separation of human activities creates the need for travel (Wegener & Fürst 2004). The component of land use determines the available opportunities for people, by taking into account where opportunities can be found and where there is demand for these opportunities. This component strongly influences the second component by creating demand to travel. The second component *transport* describes how the transport system influences the disutility of a person to travel between two locations. This component is strongly influenced by the supply of infrastructure and its characteristics. This is related to the quality of the infrastructure which influences the travel time, its reliability and the comfort of travelling. On the other side there is demand for the transport system from both personal and freight travel. The *temporal* component of accessibility is determined by temporal opportunities and constraints (Geurs and Van Wee, 2004) of both people using activities but

also the activities themselves. People are bound to a specific timeframe they can use to participate in activities, but activities are also bound by the timeframes. This is strongly influenced by the land use and individual component. This *individual* component is focused on the person itself. It is based on wishes, preferences, needs and possibilities of an individual that influence their potential for accessibility.

In figure 1 the relationship between these four components of accessibility have been visualised by Geurs and Van Wee (2004). These four components influence each other, in which they are also influenced by accessibility through a feedback loop. For example; if a new business settle down nearby (change in the land-use component), it does not only create more opportunities (thus enhancing accessibility to these opportunities, but it also changes the individual component (proximity may be good enough for car less people to reach) and gives people more time to participate in the activity as traveling takes less time (Temporal component). The presence of the new business on the other hand may attract complementary businesses as well, because the accessibility of this location has increased, thus creating a feedback loop to the land-use component.

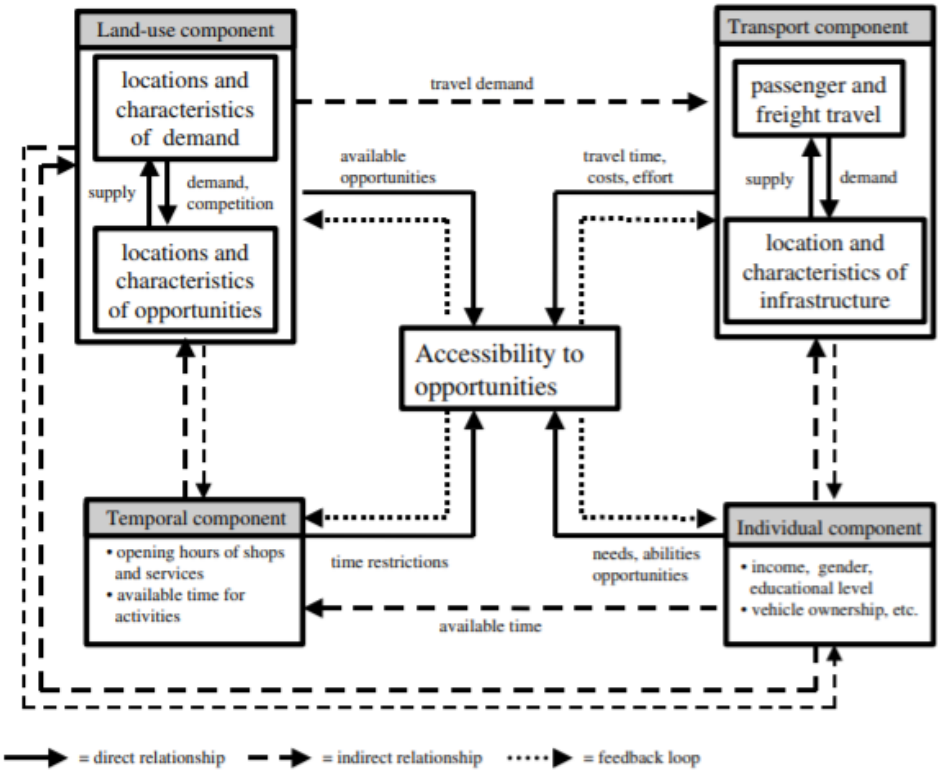


Figure 1: Relationships between components of accessibility. Source: Geurs and van Wee,

2.1.3. Perspectives on accessibility

How planners define accessibility and how they measure it has changed gradually over the last five decades, favouring more complex measures because as results did not live up to created expectations (Geurs & Van Wee, 2004; Pirie, 1979). There are numerous tools to measure this accessibility and Pirie (1978) has reviewed many of them, such as distance measures (simply the physical separation of two places is seen as the measure of accessibility), topological measures (analysing the number of links and the presence of a location, as a measure of accessibility) and also the gravity measures, which has become famous thanks to Hansen in 1959. This gravity measure is still being used today, and has now been subcategorised underneath the overarching perspective of 'location-based measures'.

This overarching perspective is one of four, created by Geurs and van Wee (2004) to categorise existing accessibility measures, based on what they are measuring. Each measure should at least take one of the previous mentioned components into account (see figure 1), but as the four components all influence accessibility, ideally all components should be used in a measure as they influence the quality of a measure (if only using 1, the results will be less trustworthy then when using 3). They help to identify which type of measure one is using: infrastructure-based, location-based, individual-based and utility-based. In their review, they scrutinise each of these perspectives and look into their advantages and disadvantages concerning their usefulness for planning accessibility. To gain an understanding of which type of perspective most closely links to the main question, thus researching the perceived accessibility of senior citizens, each perspective will be further scrutinised and the most important / often used measures within each perspective will be shortly explained.

The first perspective is *infrastructure-based*, in which measures look at the current transport system and how it works. There are two measures that are often used: (1) supply-based measures, which look at the characteristics of a transport system. This type of measure is especially useful when describing the current transport system and infrastructure supply over time or places (Van Wee, Hagoort and Annema, 2001). (2) Use-based measures analyse the performance of the transport system and aim to optimise the use of this current system. Geurs and van Wee (2004) recognise the ease of interpretation of these two measures which makes it popular among policy makers, but they are limited to the infrastructure system, without taking land-use, temporal or individual components into account. These measures only take ¼ of what Geurs and van Wee (2004) define as 'accessibility' into account, making the measure relatively unfit to analyse accessibility impacts of land use or substantiate transport policy plans.

The second perspective is categorised as *location-based*. The concerning measures analyse the accessibility between specific location, often on macro scale (regional or national level), looking to the spatially distribution of activities (Geurs & van Wee, 2004). These measures are most used by urban planning and geography studies according to Geurs and Van Wee (2004). The measure is especially effective in both social and economic evaluations, as these measures overcome the shortcomings of infrastructure based measures and can be computed in transport data and models, easing the practice of this measure. Geurs and van Wee (2004) conclude that this measure should be enhanced by no longer calculating accessibility of a location in absolutes, but rather compare them with similar, other locations.

While the location based measures are often focused on the macro scale, the measures in the *person-based* perspective are used for micro-level evaluations. They look into the accessibility of individuals and which spatially distributed activities a specific individual can participate in. This perspective is strongly based on the space-time geography, which analyses the limitations of an individual (Geurs and van Wee, 2004). The strength of this perspective and its measures are found rather in theory than in practice: measures often involve all four components of accessibility, but cannot be generalised and are difficult to carry out (Iacono et al., 2010). On the other hand has it, if correctly and extensively carried out, be used for social evaluations and possible also for economic ones if linked to a utility based measure.

The last perspective *Utility-based*, concerns the economic benefits people gain by having access to spatially distributed activities (Geurs and van Wee, 2004). They assume people always chose rational for the most benefits (Handy and Clifton, 2001). Because of these assumptions and the goal of these measures, the economic sector and studies are most interested in the results, rather than common citizens. It looks to the costs of a potential plan, weighing it to the potentially increased accessibility it may derive from this plan. These measures also overcome the shortcomings of infrastructure-based

measures, but is also able to capture value of accessibility. This allows the use of cost-benefit analyses on both land-use and transport planning (Geurs and van Wee, 2004). There are several disadvantages to these measures, because they need such extensive research, most departments of governments are incapable to carry them out and it is also very difficult to transform the gathered data into comprehensible results that can be used effectively (Handy and Clifton, 2001).

Sub-conclusion

Each of the perspectives mentioned above has weaknesses and strengths when used in planning for accessibility, as some require more or less extensive data collections, which influences how practical or abstract the method used is. They furthermore indicate what kind of accessibility they are measuring. Concerning the main question of this thesis, which is focused on the perception of accessibility of senior citizens, it seems that the *Person-Based* perspective matches closest to this question. This research will look into the perspective of different individuals, on a local level within the city of Apeldoorn. This perspective requires extensive data collection from individuals looking into their individual opinions, abilities and preferences on accessibility, which connects directly to the research question.

2.1.4. Perceived accessibility factors

As explained above, each perspective focuses on different aspects of accessibility. Each has different measures (tools) available to measure accessibility, using different (and sometimes the same) factors as indicators to analyse this accessibility.

Looking through the *person-based* perspective, the factors used will be very subjective. Handy and Clifton (2001) have researched the perception of residents on the accessibility of their own neighbourhood. They argue that measures of the *location-based* perspective are actually very helpful in identifying specific areas in a region that have either a high or low accessibility. Unfortunately, they concluded that these measures are unable to point out specific factors that actually contribute to this accessibility, explaining why they are higher or lower in specific areas (Handy and Clifton, 2001). Arguable, they consider the traditional measures (also some of the *person-based* measures) are too vague, still focused too much on objective or 'hard' factors instead on the subjective factors.

In their research, Handy and Clifton (2001) have reviewed other literature that looked into the empirical travel behaviour and the level of service to determine specific indicators that influence the perceptions of residents of a neighbourhood. To structure these indicators, Handy and Clifton have categorised them into two overarching factors. The first contains the *Activity Factors,* which contribute to the attractiveness of an activity itself or the design of a location. Therefore, Handy and Clifton (2001) created two sub-factors within the *Activity Factor* itself to accommodate all indicators (See table 1). All indicators have been further operationalised in Appendix 1.

TABLE 1 Activity Factors

Factors related to activity	Size and scale
	Quality of products/services
	Variety of products/services
	Price of products/services
	Hours of operation
	Crowds/lines
	Interior design
	Atmosphere
	Ownership (local vs. chain)
	Customer recognition
Factors related to site design	Mix of activities at site
	Density of activities at site
	Parking facilities
	Atmosphere
	Landscape design

Table 1: Activity factors of accessibility. Source: Handy & Clifton, 2001.

The second group that influences the perception of accessibility is focused on *Transportation Factors*; how residents can access the activity itself. This is strongly influenced by the transport mode and individual uses. All indicators influencing this factor have been categorised into five sub-factors. In order to gain a full understanding of perceived accessibility, the writers have decided to look at these Transportation Factors per mode of transport (Handy & Clifton, 2001). In table 2, all of these transportation factors have been illustrated per mode of transport they influence and their operationalisation can be found in Appendix 2.

TABLE 2 Transportation Factors by Mode

	Automobile	Transit	Walking	Bicycling
Impedance factors				
Distance	X	X	X	X
In-vehicle time	X	X		
Out-of-vehicle time	X	X	X	X
Cost	X	X		
Topography			X	X
Level-of-service factors				
Volume/crowding	X	X	X	X
Signalization	X	X	X	X
Service frequency		X		
Hours of operation		X		
Directness of route	X	X	X	X
Continuity of route	X	X	X	X
Information availability		X		
Signage	X	X	X	X
Facility widths	X		X	X
Vehicle design	X	X		X
Shelter		X	X	X
Benches		X	X	
Terminal factors				
Parking availability	X	X		X
Parking cost	X	X		
Terminal locations		X		
Intermodal connections		X	X	X
Terminal design	X	X	X	X
Comfort factors				
Traffic speed	X	X	X	X
Traffic volume	X	X	X	X
Pavement condition	X	X	X	X
Lighting	X	X	X	X
Weather	X	X	X	X
Shade		X	X	X
Scenery	X	X	X	X
Crime/police presence		X	X	X
Cleanliness		X	X	X
Conflicts with other modes	X	X	X	X
Other users	X	X	X	X

Table 1: Transportation factors of perceived accessibility. Source: Handy and Clifton, 2001

2.1.5. Perceived barriers

Research on the accessibility of seniors is too often focused on seniors that face mobility-impairment, because this group of the senior population is the least mobile (Haustein, 2012). This does not create a representable view on the perception of the average senior citizen. In her research, Haustein (2012) distinguished four different groups of seniors: (1) Captive Car Users, (2) Affluent Mobiles, (3) Self-Determined Mobiles & (4) Captive Public Transport Users. The first group has reasonable access to a car, and is most dependent on this mode of transport. The group perceives low control of public transport (the feeling one is unable to use public transport) and has an aversion towards more active modes of transport such as walking or cycling. The second group has high car availability and has the highest income. The people of this group often have a large social network and therefore to desire to remain as mobile as possible. They also perceive low public transport control, but enjoy walking and cycling. The third group does not feel the need to travel. They feel in control of public transport, have car availability and are ok with walking. They do dislike cycling and have the lowest income. Seniors that relate to the last group, often live alone and have the best access to public transportation, but are also the most dependent on this mode or transport. Based on these different 'groups' seniors can be part of, it can be concluded that the groups of captive car users and captive public transport users have a lower accessibility rate than the other two groups. This is a consequence of being bound to a single mode of transport rather than more modes. These two groups also have the lowest incomes and have less motivation to use an active form of transport (cycling and walking). The affluent mobiles and self-determined mobiles have more options to travel about and have a much more positive perspective on active mobility.

Mollenkopf et al. (2004) also conclude that a difference should be made between seniors living in urban or rural areas because those living in urban areas have a higher mobility rate than those living in rural areas. Finally, there are Risser et al. (2010), who have researched barriers and motives perceived by seniors on their outdoor mobility. Their research took place in eight different countries throughout Europe (the Netherlands was not included). While they have focused on mobility barriers, their results include accessibility barriers which concern the ease at which seniors perceive their journeys. Risser et al. (2010) distinguish the previously mentioned arguments by Haustein (2012) and Mollenkopf et al. (2004): seniors from all different backgrounds have been interviewed, both in focus groups and one-on-one interviews. In the qualitative part of their research, perceived barriers are categorised by importance (Risser et al., 2010). In table 3, 18 barriers have been stated, prioritised by seniors. The far right side of the table also displays the opinion of experts on these barriers of seniors. When comparing the table, there is a clear difference in prioritisation of the barriers between seniors and experts, showing seniors perceive these barriers different from how experts except them, to perceive.

The barriers in Table 3 can be linked to the previous mentioned factors by Handy and Clifton (2001). They are more specified than the indicators are: the first barrier of for example 'inconsiderate car drivers' can be linked to the Transportation factors 'Conflicts of modes' (See Table 2). Each barrier of Risser et al. (2010) can be linked to an indicator, which gives a first impression on which indicators are specifically important to seniors in their perceived accessibility.

Mobility barriers	Numbers of agreements in valid per cent %			
	Seniors ($N = 3309$)		Experts ($N = 490$)	
	Always/often a problem (rank)	Never/some times a problem	Always/often a problem (rank)	Never/some times a problem
1. Inconsiderate car drivers	49 (1)	51	72 (3)	28
2. Lacking toilets	49 (1)	51	78 (1)	62
3. Vehicles on footpaths	44 (3)	56	65 (5)	35
4. Public transport vehicles overcrowded	42 (4)	58	60 (7)	40
5. Negative attititudes to-ward aged people	39 (5)	61	49 (13)	52
6. Loose animals	36 (6)	64	39 (16)	61
7. Drivers are ruthless	33 (7)	67	44 (14)	56
8. PT does not match customer needs (routes/frequencies)	32 (8)	68	51 (11)	49
9. Transfers badly designed	32 (8)	68	59 (8)	41
10. Decreasing senses	32 (8)	68	73 (2)	27
11. Lacking punctuality	30 (11)	70	38 (18)	22
12. To few traffic signs	29 (12)	71	55 (10)	45
13. Insecure when walking	29 (12)	71	63 (6)	37
14. Ramps	25 (14)	75	44 (14)	56
15. Roundabouts	22 (15)	78	57 (9)	43
16. Reliance on people	21 (16)	79	67 (4)	33
17. Badly adapted signals	20 (17)	80	51 (11)	49
18. Uncomfortably designed car	15 (18)	85	39 (16)	61

Table 3: Mobility barriers for seniors based on importance by seniors and experts. Source: Risser et al., 2010.

Table 4 shows the categorisation of all barriers to their matching factor. Based on this categorisation, almost all barriers perceived by seniors are related to Transportation Factors, while no Activity Factors have been noted. Especially 'Conflict with other modes' and 'Other users' have been categorised more than once, suggesting that these two indicators are important for seniors in their perceived accessibility. Both of these indicators are social influences. In Table 4 remain six barriers that could not directly be categorised within the two existing overarching factors of Handy and Clifton (2001).

Barriers (Risser et al. 2010)	Categorised by overarching factor, sub-factor & indicator (Handy and Clifton, 2001)
Inconsiderate car drivers	Transportation factor – Comfort - Conflict with other modes
Lacking toilets	-
Vehicles on footpaths	Transportation factors – Comfort - Conflict with other modes
Public transport vehicles overcrowded	Transportation factors – Level-of-Service - Volume / crowding
Negative attitude towards aged people	Transportation factors – Comfort - Other users
Loose Animals	Transportation factors – Comfort - Other users
Drivers are ruthless	Transportation factors – Comfort - Conflict with other modes
Public Transport does not match customers' needs	Transportation factors – Level-of-Service - Service frequency
Transfers badly designed	Transportation factors – Terminal Factors - Terminal design
Decreased senses	-
Lacking punctuality	Transportation factors – Level-of-Service - Service frequency
Too few traffic signs	Transportation factors – Level-of-Service- Signage
Insecure when walking	-
Ramps	-
Roundabouts	-
Reliance on people	-
Badly adapted signals	Transportation factors – Level-of-Service- Signalisation
Uncomfortable car design	Transportation factor – Level-of-Service - Vehicle design

Table 4: Categorisation of barriers by Risser et al. (2010) to the factors of Handy and Clifton (2001)

If one can assume that the indicators in Table 4 are indeed important to seniors, the six uncategorised barriers would also be of influence on their perceived accessibility. Therefore, these six barriers should be categorised as 'new indicators' in order to accommodate these already perceived barriers by seniors, into the framework of perceived accessibility. Two of these barriers: 'Lacking of toilets and 'Roundabouts' could be added as complementary indicator underneath one of the sub-factors of Activity- and Transportation factors. The barrier of 'Lacking toilets' has been subcategorised underneath 'Activity Factors, as 'Facilities'. And the second barrier 'Roundabouts' has been subcategorised underneath 'Transportation Factors as 'Infrastructure Design'.

The four barrier that remain, cannot be categorised underneath the two existing overarching factors that have been created by Handy and Clifton (2001). Decreased senses, insecure when walking, ramps and 'reliance on people' are all barriers that are very personal and differentiate per person. These personal influences have not been incorporated by Handy and Clifton (2001), but the research of Risser et al. (2010) indicates that these barriers are indeed perceived by seniors, and therefore should be incorporated into this framework.

A new overarching factor has been created to accommodate these specific barriers in this research: *'Personal Factors'.* These 'Personal Factors' determine the individual factors that influence the perception of a person. Two sub-factors have been added to this group: 'Health' and 'Social Network'. In Table 5, the remaining barriers have been categorised underneath new indicators.

Barriers (Risser et al., 2010)	Categorised in overarching factor, sub-factor & indicator (Handy and Clifton, 2001)
Lacking Toilets	Activity Factors – Related to Activity - Facilities
Decreased senses	Personal Factors – Health - Observation Skills
Insecure when walking	Personal Factors – Health - Decision making
Ramps	Personal Factors – Health - Execution of actions
Roundabouts	Transportation Factors – Comfort - Infrastructure design
Reliance on people	Personal Factors – Social Network - Relation to family

Table 5: New categorisation of barriers by Risser et al. (2010) to the adjusted factors of Handy and Clifton (2001)

Sub-conclusion

The research by Handy and Clifton (2001) indicates that there are two 'overarching' factors that influence the perceived accessibility of seniors. Based on the research by Risser et al. (2010), another 'overarching' factor has been suggested to facilitate perceived barriers that could not be categorised within the two original ones. This indicates that the current theory of Handy and Clifton (2001) does not yet fully cover all aspects of perceived accessibility. The research by Risser et al. (2010) has taken into account accessibility barriers, but at the same time, the overall focus has been on out-door mobility. This may explain the overrepresentation of Transportation Factors that have been identified, while Activity Factors and Personal Factors are underrepresented. It is also possible that Transportation Factors have a greater influence on the perceived accessibility of seniors and therefore recur more often in the results.

A comparison between the studies of Handy and Clifton and Risser et al. (2010) suggests there is indeed a difference in indicators that are important for seniors and the 'average' person. Most of the sub-factors stated by Handy and Clifton (2001) do not recur within the research of Risser et al. (2010). This suggests not all indicators by Handy and Clifton (2001) are important to this population group. The differences within the research of Risser et al. (2010) strengthens this, because seniors ranked barriers different from how experts on seniors do. This indicates that even experts do not fully grasp the way seniors perceive their accessibility.

2.2. Conceptual model

Based on the theory elaborated above, it has become clear that four components need to be taken into account when determining accessibility. Depending on which perspective one takes on accessibility, different factors need to be incorporated. Following, these factors define the overall accessibility of a person or location. Based on the research of Handy and Clifton (2001) and Risser et al. (2010), this study defines perceived accessibility by three factors: Activity Factors, Transportation Factors and Personal Factors. Therefore, a fourth sub-question is added to this research:

(4) What role do Personal factors play in the perceived accessibility of seniors?

Hence, the following conceptual model has been created:

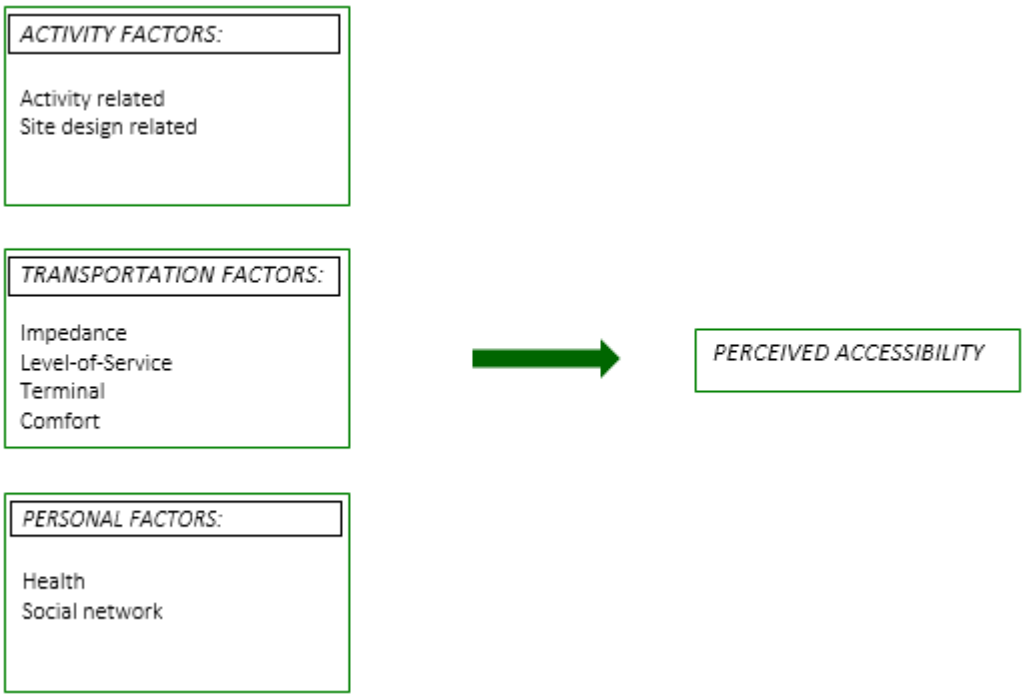


Figure 2: Conceptual model. Source: own design

Figure 2 illustrates the assumption that perceived accessibility is influenced by three types of factors: Activity, Transportation and Personal Factors. Based on the literature, most of their indicators influence the perceived accessibility of seniors. Through an explorative case study, this research will attempt to gain a better understanding of which specific indicators do and do not influence the perception of seniors and will attempt to find new indicators that specifically influence seniors.

2.3. Operationalisation

In this paragraph, the concepts within the conceptual model (figure 2) will be further explained and operationalised. Each Factor contains several indicators, which influence the experience of accessibility of a senior (who will be defined further in chapter 3). By operationalising specific concepts, the researcher has gained a better understanding on how the concepts need to be researched individually, but also helped mapping out how these concepts could possibly influence each other or not.

Activity factors

Activity factors contribute to the attractiveness of an activity or the design of a location. (Handy & Clifton, 2001) These indicators form the 'pull' factors towards certain locations and activities. Influenced by preferences, needs and abilities of their specific users, these indicators determine the attractiveness of a destination. This concept can be subcategorised into two types of factors: 'Related to Activity' and 'Related to Design'. The ten indicators 'Related to Activity' all surround the topic of how an individual can perceive a specific activity (Handy & Clifton, 2001). These ten indicators are: size or scale, quality, price, variety, hours of operations, crowds, interior design, atmosphere, ownership and customer recognition. There are five indicators that represent the design of the site. Based on their research, Handy and Clifton (2001) have concluded that the outer presentation of a building or design in which the activity takes place has almost as much influence on the perception of accessibility than the activity itself. The following five indicators are included: mix of activities on site, density of activities, parking facilities, atmosphere and landscape design. All these 15 indicators have been fully operationalised in Appendix 1.

Transportation Factors

The concept of Transportation Factors contributes to the ability of individuals to get to activities. Handy and Clifton (2001) have determined that not just distance and time are important for the modal choice of an individual, but that there are numerous indicators that influence this decision. These indicators contribute to the perception people have on their accessibility. And have been categorised into the following sub-factors: 'Impedance', 'Level-of-Service', 'Terminal' and 'Comfort'. 'Impedance' factors represent the burdens required to travel to a specific location. 'Level-of-Service' factors explain the services provided along the travel to the destination that either ease of complicate the journey. 'Terminal' factors include the influence that transit locations have on the journey of an individual, focused on the terminals this takes place. The last group of factors (Comfort), represent the ease (or lack of) factors that influence the perception of an individual. These 33 indicators that together represent Transportation factors have been further operationalised in Appendix 2.

Personal Factors

This 'new' factor contributes to the internal influences of a person on their perceived accessibility. Based on the work of Risser et al. (2010) it has become clear that several perceived barriers by seniors were not based on either the activities nor the manners of transport, but these barriers lie with themselves. Therefore, a new overarching factor has been introduced. Based on their research, currently two new sub-factors have been included: 'Health' and 'Social Network'. 'Health' factors represent the influences of both the mental and physical health of an individual and its influence on their journey. This factor includes: observation skills, decision making and execution of actions. The second sub-factor 'Social Network', explains the special relations an individual has with others, which impact the journey they wish to make. Up to this point, this factor includes: living situation and family relations. Currently these 5 indicators together represent the Personal Factors and are further operationalised in Appendix 3.

Chapter 3: Methodology

This chapter will further elaborate on the paradigm of this research. It will discuss the underlying research philosophy, the strategy which derives from this and the methods and analyses used in this research, which are consequently based on the chosen strategy. All choices made in this paradigm have been used to answer the main question of this research: *How do seniors in the city of Apeldoorn experience their accessibility and which factors influence this perception of accessibility?*

3.1. Research philosophy

Before starting research, it is important for researchers to reflect on their own assumptions and beliefs of what knowledge is and the way it is acquired and how it develops (Saunders, Lewis & Thornhill, 2015). This concept is known as a research philosophy, which helps set straight the assumptions of a researcher. Saunders et al. (2015) explain that not one philosophy is 'the best', but each have a unique approach, giving different perspectives to reality. The research philosophy therefore determines what type of strategy one should follow and which type of methods and analyses match with the assumptions made.

The nature of this research focuses on how a person views a specific concept, rather than purely looking into the concept as an independent entity. This would make the positivism paradigm unsuitable, as it searches for absolute answers in which the context (thus the persons view) does not make a difference (Scotland, 2012). More in line with this research are the paradigms of interpretivism and criticism. These two paradigms both incline the idea that reality is not fixed (Crotty, 1998). The critical paradigm is grounded by the idea that reality is constructed by history, culture and language that constantly changes, while the interpretivist paradigm is grounded in the idea that each person has its own perception of reality, and therefore there are as much realities as people (Scotland, 2012). Handy and Clifton (2001) have found perceived accessibility to differ considerably within the same neighbourhood. People perceived their surroundings differently, prioritising other things than their neighbours: each person has his or her own view on reality, giving another meaning to it, which creates different perceptions towards a concept such as accessibility (Crotty, 1998). Professor Dudau (2015) of the University of Glasgow explains:

If you view the world as ugly, you will act on this act of predisposition. Whether or not the world is beautiful, if you do not see it as such, it does not make any difference. You would still do things according to your view of the world.

Dudau (2015) describes that people will act upon their perception of the world, whether or not others agree to this perception. While every person perceives an own reality and thus might not agree on how they perceive their accessibility, they can find common ground on how their perception is influenced and which factors they believe are important to do so. As this research seeks understanding and perceptions of individual seniors to uncover reality (e.g. their perceived accessibility) it holds on an interpretivist stance: "Interpretivists believe an understanding of the context in which any form of research is conducted, is critical to the interpretation of the gathered data" (Thanh & Thanh, 2015). The researcher uses these perceptions to construct and interpret her understanding from the gathered data.

3.2. Research approach and strategy

Using a specific paradigm in this research, the interpretivist stance consequently influences the research strategy that has been chosen (Guba & Lincoln, 1994). Doorewaard and Verschuren (2007) explain that the research strategy as a set of comprehensive decisions that ultimately explain how the research is going to be executed.

Considering the scope of the main question, the focus has been laid on how seniors perceive their own accessibility and which indicators play a role in creating this perception. There has already been done much work on accessibility and its perceptions, but almost none through the eyes of seniors, linking their perceptions to possible indicators (Handy & Clifton, 2001; Risser et al., 2010). Because this research wants to contribute to gain a better understanding of specific indicators that influence the perception of senior citizens and understand what the nature of these perceptions is, the nature of this research will be explorative (Jenkins, Nader, Lawler & Cammann, 1975). This research therefore follows an inductive approach since induction proposes that theory evolves out of research (Bryman & Bell, 2007) whereas deduction aims at testing theory. (Saunders et al., 2015). Qualitative strategy and research, specifically in-depth interviews, will be followed to evoke what seniors feel and relate to when talking about their perceived accessibility.

The interpretivism paradigm also has a preference of qualitative research over quantitative (Scotland, 2012). This is based on the ability of qualitative strategies to enquire in-depth knowledge of the experiences and ideas of participants on concepts. In line with the research question and aim, which focus on the 'perceptions' of people, a qualitative strategy will enable this question to be answered as thoroughly as possible.

To answer the main question, a multiple case study has been chosen within the city of Apeldoorn. Saunders, Lewis and Thornhill (2007) argue that a case study is especially useful to not only find answer on the 'what' and 'how' but also to the 'why', which strongly correlates with the purpose of explorative research. Solberg Soilen and Huber (2006) mention that case studies in general generate background information to the discussion of a concrete problem: understanding which factors influence the perception of seniors in their accessibility, can become a stepping stone to understanding how to keep seniors engaged with society. As the research is open to interpretation of both the respondents and the researcher, a multiple case study will strengthen the reliability of this thesis, as you gain the ability to conform the results between different cases (Swanborg, 2008). It will help the researcher to understand the differences and similarities between several cases and help conclude whether the findings are valuable or not (Gustafsson, 2017).

This study is limited in its ability to generalise the results further than Apeldoorn itself. Swanborg (2008) states that even with multiple case studies, you may not necessary find results that can be generalised. This is linked to the limits of qualitative research: data is often context related and resource consuming to obtain (Iacono et al., 2010). This explorative study means to find potential other factors that may need to be included in the framework by Handy and Clifton (2001). While the results may not be generalised, they will give an indication of various indicators that are influential for seniors and their perceived accessibility. This may serve as a foundation for future research to determine whether these factors are generalizable or not.

Selecting the cases

For this research, two neighbourhoods in the city of Apeldoorn have been chosen as cases. The city of Apeldoorn is an interesting city due to its fast 'greying' population. In 2017, over 32.000 of its citizens were 65 years or older and current prognosis foresee an increase up to 47.000 seniors by 2040 (Gemeente Apeldoorn, 2018). As one of the most greying cities in the Netherlands, it is important for the municipality to understand how to keep this city accessible for this growing population group that is losing its mobility. The researcher has combined this thesis with an internship at the municipality of Apeldoorn, giving the researcher access to several resources, which have helped selecting the cases within the city as well as the respondents.

In order to select the cases, three indicators have been set. The first two indicators are considered 'hard' indicators, which narrowed down the potential districts, whereas the last indicator is 'soft' and was used to select the final cases with equivalent properties. The first two indicators are (1) the concentration of seniors within a neighbourhood and (2) the proximity to facilities within (and beyond) the neighbourhood. The selected neighbourhoods have been chosen with the purpose to differentiate from each other: one low concentrated neighbourhood, further away from facilities and one high concentrated neighbourhood, nearby facilities. The last indicator is based on (3) the willingness and ability of involved actors to participate with this research.

To determine the concentration of seniors in specific parts of the city, a heat map has been used, based on data of the municipality of Apeldoorn. In Appendix 4, this heat map is presented. It illustrates the concentration of seniors by colour, in which red indicates a high concentration and green indicates a low concentration of seniors. Based on the heat map in Appendix 4, each district has been evaluated to match the first indicator mentioned above. Most districts were eliminated as possibilities due to the equal concentration of seniors throughout districts (Most of the district having the same colour), while the study is looking for difference between neighbourhoods.

The second indicator was based on data from Statistics Netherlands (CBS, 2019a), which measures the proximity of neighbourhoods to the following facilities: supermarket, hairdresser, pharmacy, snack bar, general practitioner. This indicator reduces the potential districts to four: Northeast, West and Southeast)

The last indicator has been used to come to a final case selection. The researcher has spoken to three district managers of the municipality: Astrid Willemsen (Northeast) Wim Bergink (Both North and West) but also to Corine Kapenga (Southeast). While the district of Southeast was originally taken out of the selection, the researcher did have a conversation with this specific manager about the neighbourhood due to other research on accessibility that is being carried out, which would possibly make for a useful connection to this research. Prior to these conversations, the researcher has gone in the field and has taken two field observation trips in order to gain an understanding of each of these neighbourhoods. With the help of each district manager, the researcher gained notion of the possibilities within the districts and which neighbourhoods within it would be the most interesting to select as cases. Both Wim Bergink and Corine Kapenga were very amenable to facilitate in knowledge as well as contacts that might be able to further the research. Based on this knowledge and the ability of contacts to help the researcher, the final selection of a district and the neighbourhoods has fallen on West, with Berg en Bos and de Orden as specific cases.

Selecting the respondents

The main question will be answered through the use of mental maps during semi-structured interviews, which will be further explained in paragraph 3.3. To select the specific respondents in the chosen neighbourhoods, the population for this research is defined as followed: (1) Seniors above the age of 75 years old, (2) whom live independently in their homes (3) within either of the two selected neighbourhoods. As this is an explorative research, a conscious choice has been made to find a diverse as possible group of respondents with the given indicators.

To ensure the internal validity of a study, the number of respondents for a study is based on the scope and the number comparisons being made (Bryman, 2016). This study includes two cases with two different types of areas (located near of far from facilities and the concentration of seniors living there) and therefore it has been decided to have seven respondents per case. This creates a total of 14 respondents, which can be found in Appendix 5.

The municipality of Apeldoorn had some resources to contact people who are able to help find these specific respondents. Due to the AVG-law, the municipality is not allowed to distribute any personal information such as in which specific houses seniors live. Therefore, the following methods were used to contact possible respondents:

(1) Through contact with the neighbourhood council of Berg en Bos, flyers have been spread out during a neighbourhood meeting. These flyers contained a short introduction to the research and the request to contact the researcher through email or phone. This produced four respondents
(2) A small add has been placed in the newspaper of Berg en Bos, also shortly introducing the research and containing the contact details of the researcher. This newspaper was published in the beginning of July and has produced three respondents
(3) Through the district manager, two civil workers have been contacted whom visit seniors in both neighbourhoods. They have asked several clients to participate. This resulted into two interviews.
(4) The researcher has visited three meeting places in the neighbourhood the Orden. The first, Mandala, is located in a senior flat in which seniors remain independent, but have the luxury of a common space and health care included. At this location, activities are held, specifically for seniors, from both within the flat as well as for seniors outside. This visit resulted into three interviews. The second meeting place 'Orca' has one senior activity each week, which was visited twice. This resulted into three interviews. The last meeting place visited 'Orden Plus', had no senior specific activities, but general coffee moments every week. No interviews were taken here.

3.3. Data collection and analyses

In order to answer the main question of this research, one research method has been used to collect necessary data. Through the creation of Mental Maps during semi-structured interviews, insights will be gained on senior specific indicators that influence their perceived accessibility. These insights will be complimentary to the factors and indicators set by Handy and Clifton (2001) on the perception of neighbourhood accessibility. These factors and indicators will be used throughout the interviews.

Mental Maps

During the interviews, the respondents have been asked to draw a mental map of their perceived accessibility. Buzan and Buzan (2002) explain that mental mapping is a representation of ideas of

people, which offer a direct representation on the perception people have on their own accessibility. The seniors were shorty introduced to the concept of a mental-map before they were asked to draw their accessibility to activities. Throughout an interview, the mental map has been used as a support tool for both the respondent as well as the researcher. It helped the respondent to consider their the accessibility of each destination, relatively to one another: for every new destination the respondent lists, the respondent was asked to place this destination on the mental map, relatively to the already placed destinations. For the researcher, the mental maps would function as reminder of which activities should be discussed in which continuity during the interview itself. Each time the respondent hesitates, the interviewer repeats the concept of accessibility, asking the respondent questions on how accessible they find one place compared to the other. When respondents got stuck, the interviewer gave some suggestions towards possible indicators the respondents have not thought of. During these suggestions, the interviewer has tried to remain objective and refrain from steering the respondent towards a certain train of thoughts.

After the interviews, the researcher has taken up both mental maps and interviews to identify which locations are most important to the respondents, in order to answer the first sub-question of this research. The researcher has also compared the locations set on the maps, to the answers of the respondents during the interview on these locations to identify any differences between the 'said' answers and the 'written' answers.

Interviews

There has been chosen to do semi-structured interviews to gain a further understanding of the mental maps that have been drawn by the respondents. Another option to gain this understanding would have been through the use of a focus group with the four respondents per case, because statements of one another can create associations with situations they had not come up with themselves (Risser et al. 2010). But the strength of semi-structured interviews lie with the 'safety' respondents feel and one can commit things that they do not wish to say aloud in a group, being afraid or feeling themselves weak (Kvale And Brinkmann, 2008). As stated before, seniors are often in denial of becoming less mobile or face weakened senses to travel by themselves, which may obstruct them from honestly pointing out factors while in a group. Therefore, there has been chosen to do these individual face-to-face interviews with the respondents.

Because the respondents must feel as comfortable as possible, the respondents have been asked to select a location for the interview. Between the 29th of May and the 10th of July 2019, all fourteen interviews have been conducted at several locations in Orden and Berg en Bos. Five respondents have chosen a public location rather than their own homes, in two different community centres. To ensure an environment in which the respondent would be 'free' to tell their whole story, a quiet place in the centres were chosen so people were out of earshot, but still be physically in the same room to comfort the respondent. The other nine interviews have been conducted at the homes of the respondents, without other people present to keep the respondents from getting distracted.

On average, the interviews were 40 minutes long, but there were a few outliers, because the shortest interview is 15:37 minutes and the longest 64:14 minutes. The longer interviews have digressed to unrelated topics in which the researcher could not directly return back to the original topic of the interview without being disrespectful to the respondent. The shortest interview is based on a respondent who almost does not leave her house, thus cutting the interview short after these few locations were discussed.

The face-to-face interviews are semi-structured. It gives the researcher the option to go in-depth on specific questions on the map that has been drawn by the respondent (Baarda, Bakker, Julsing, & Fischer, 2014). Baarda et al. (2014) explain that semi-structured interviews allow the researcher to stay on topic, following an interview guide but at the same time remain flexible on the structure of the whole interview. To gain a full understanding of the created map and understand why the respondent has drawn it this specific way, the first part of the semi-structured interview has covered the mapping process and results of the respondent, covering all specified facilities and their accessibility. During the interview, the researcher engaged with the respondent in order to understand the underlying indicators that influenced the respondents view on the accessibility of specific facilities. The second part of the interview has covered 'other' indicators the respondents have not come up with by themselves, to understand whether these 'other' indicators indeed are not important to the respondents or are just forgotten during the mental mapping.

This interview guide has been prepared thoroughly and has been discussed with two supervisors of the municipality of Apeldoorn: T. Thissen, Advisor Physical Environment and B. de Leeuw, Advisor Infrastructure Design. To increase the validity of this research further, a pilot interview has been held: a full interview has been held with a senior of 80-year-old who lives at home, to test the structure of questions to test if the respondent could understand the idea of drawing a mental map. Following this pilot interview, some questions have been revised to ensure the respondents can understand them. Taking these extra precautions has enhanced the trustworthiness of this research as well as the possibility to test the question techniques which enhanced the internal validity of the research (Saunders et al., 2007). The final interview guide can be reviewed in Appendix 6.

To analyse the interviews, the researcher has coded each interview separately using Atlast.ti. First, a code network has been created, which reflects the conceptual framework of this research: the Activity Factors, the Transportation Factors and Personal Factors have been coded into this program, so each sentence relating to each of their indicators could be linked easily. During the coding, not only the 'known' codes have been selected, but new indicators that came forward have been placed under 'unknown factor'. Furthermore, all modes of transport have been coded, as well as activities that respondents participate in. After all interviews were coded, each coded interview was reviewed by the researcher. New codes have been added, linking specific reactions and experiences of each respondent to each other. During this process, a log (memos) has been kept of each respondent to keep track of new these new links that were made. Furthermore, memos have been made of striking phenomenon perceived by the researcher, so all thoughts could be written down and be reviewed later to confirm or discard them when all interviews were reviewed a second time.

To ensure the coding method of the researcher could be considered valid, two interviews have been sent to M. Leijser, lecturer of qualitative methods of the Breda University of Applied Sciences (BUAS), has coded these interviews separately, which later have been sent back and to be compared to the current coding system.

The coding of the interviews will show which indicators have a high frequency, and therefore have a solid influence on the perceived accessibility. Yet based on reading through the interviews, some indicators have been coded only a few times, while their impact has been huge. The coding of the interviews could not do this alone, therefore the interviewer had to analyse the interviews individually and look into the context of each indicator and its influence to put each indicator and their importance and frequency in perspective.

3.4. Reliability, Validity and Generalizability

Although qualitative data allows the exploration of further key factors influencing the perceived accessibility of seniors, it also might lead to limited validity and reliability of this study. Both the interpretivism orientation and the qualitative approach tend to be too subjective – thus more risk of biased influences- but is also often claimed to raising generalizability issues (Baarde et al., 2014; Bryman & Bell, 2007; Saunders et al., 2015). Saunder et al. (2009) argue that qualitative research has a subjective nature and that "all you can do, is reduce the possibilities of getting the wrong answer." (p. 156). During this study, the researcher has therefore strived to maximise its credibility by taking several steps in the research process to guarantee the reliability and validity of the study, of which some have already been explained in the previous paragraph.

Reliability

First of all, the concept of reliability concerns the replicability of a study to get the same findings (Saunders et al., 2009). The ability to replicate a study is especially challenged with qualitative research. Robson (2002) gives four main negative influences on the reliability: (1) the respondent 'error', which signifies the possible differences between respondents, of which one might be happy during the interview, while the other feels sad, answering questions different. While the researcher could not influence the emotional state the respondents were in, interview locations were set by the respondents themselves to ensure they would feel completely comfortable during the conversation. (2) The respondent 'bias', in which the respondents might tell the researcher what he or she wishes to hear, rather than their actual opinion on a concept. Because some seniors might not have come to terms with their mobility loss, of other traumas that might influence their experience with accessibility, each interview has been face-to-face and interviews were held alone, or in some cases with other people at a distance so the respondent would not feel conflicted about them listening. (3) The observer error is based on the consistency of the researcher during the data collection. If the data collection is not consistent, respondents might answer questions different from each other. To overcome this issue, the researcher kept a comprehensive record of the research method and descriptions of the interview processes so they can be closely replicated. The interview guide has been semi-structured, which the researcher has followed each interview, with the possibility to delve deeper into specific topic when non-comprehensive answers were given by the respondent. The last threat, as Robson (2002) calls it, is (4) the observer bias, which relates to a researcher interpreting the given answers by respondents, which should be interpreted consistently. To create transparency in the interpretations of the researcher, each interview has been recorded, transcribed and eventually coded in the same structure. The coding schemes have also been published in Appendix 8, to create further transparency in the research process of this study.

Validity

The second important influence on the credibility of a study, is its validity. Saunders et al. (2009) define the (internal) validity of a study as followed: "The extent to which findings can be attributed to interventions rather than any flaws in your research design." Validity therefore concerns itself with how 'truthful' the findings of a study are. Saunders et al. (2009) furthermore explain there are different types of validity that should be kept in mind while doing research: (1) Internal validity, which concerns the ability to gain the answers that will actually answer your questions. The researcher has taken precautions while preparing the interview guide by ensuring it has been reviewed by two members of the municipality of Apeldoorn, both advisors in planning. Secondly, a pilot-interview has taken place to test if the structure of the interview allowed for the retrieval of subject-relevant answers. Alterations were made in the questions and the explanation of the mental maps to ensure the respondents would

understand what was expected of them during the interview. To further strengthen the internal validity, two interviews have been coded by an independent research lecturer of the BUAS. This has been done to compare the coding schemes of the researcher, limiting possible wrong interpretations during the coding process. The (2) content validity concerns to which extent the data collection methods (semi-structured interviews) have 'adequate coverage' (Saunders et al., 2009). The interview guide has been structured likewise the conceptual framework of this study. Therefore each overarching factor and their indicators have been included in the interviews. Each indicator, sub-factor and their overarching factors have been operationalised comprehensively (See Appendices 1, 2 and 3) to ensure the researcher understands the content of each concept prior to the interviews. Every single indicator has been operationalised prior to the interviews. The interview guide (See Appendix 6) furthermore contained a comprehensible overview of all indicators per overarching factor, to help the researcher to keep track of which indicators have occurred in the conversations and which did not.

Generalisability

The generalisability of a study concerns the degree to which a study can project its findings on other cases and populations (Saunders et al., 2009). A study does not necessarily need to be generalizable to be credible, but it does determine to which degree the findings can be used. A research with low generalisability, has a high change of gaining different findings if repeated at a different location. The study is based on the theory by Handy and Clifton (2001) who in their research stress that perceived accessibility is highly context dependent and therefore can differ enormously within the same neighbourhood. On the other hand, the indicators that are used by Handy and Clifton (2001) are more generalizable, as the framework can be implemented in different parts of a neighbourhood. This means the actual perceived accessibility is not generalizable, but their indicators are. The findings on 'how seniors perceive their accessibility' can therefore not be generalized beyond the borders of the city of Apeldoorn itself. As there are relatively many respondents (fourteen) for the two cases that have been chosen, one could argue that the findings of this study concerning the overarching factors and their indicators, send a signal that these indicators might be applicable to other seniors living at home in similar municipalities as Apeldoorn.

3.5. Research design

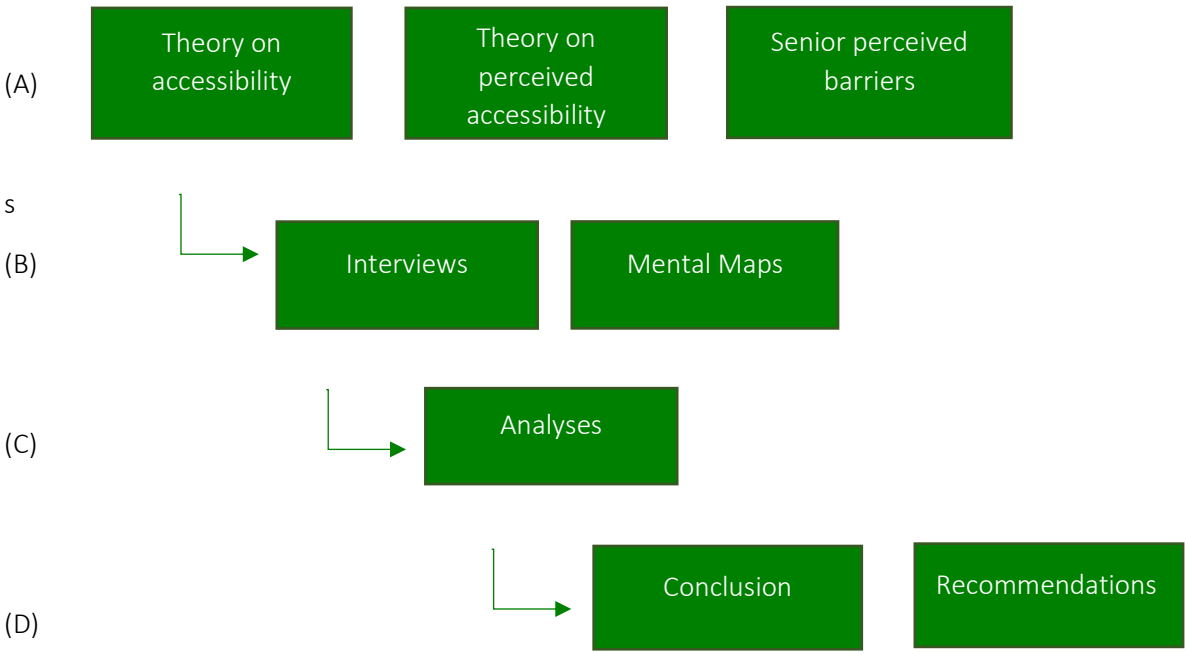


Figure 3: The research design. Source: Own design

Figure 3 is the visualisation of the research design that has been followed throughout this research. The design offers an understanding of the steps and overall process that has been followed: First of all (A), this research has been based on the theoretical framework in chapter 2 which focuses on accessibility in general, followed by scoping into perceived accessibility. At last, the theory has looked deeper into the personal characteristics of senior citizens. After the theoretical framework has been set, four different cases in the city of Apeldoorn will be researched. This will be achieved by developing mental maps based on the research subject's input and subsequently held semi-structured interviews. By employing interviews, the underlying motivation and relevant indicators for the mental map's content will be examined. The results of these two cases will be thoroughly analysed (C) and finally these analyses will conclude (D) into answering the main question and possible sub questions stated at the beginning of this research and recommendations to the municipality will be given.

Chapter 4: Results

The previous chapter has elaborated how the interviews and the mental maps have been conducted and how these have been thoroughly analysed. This chapter will describe the results of these analyses. First of all, both cases will be introduced, followed by an elaboration of which destinations are important to the respondents of this research. The second part of this chapter will scrutinise each all indicators that have been discovered per overarching factor. This chapter will conclude with a synthesis that will assess the found results to the theoretical framework in chapter 2.

4.1. Case descriptions and Destinations

The two neighbourhoods that have been selected for this research have been set-up noticeably different from each other. As explained in the case selection, one neighbourhood (Orden) is located in the proximity of several facilities and has a high concentration of seniors living in it, while the other neighbourhood (Berg en Bos) has almost no facilities in its proximity and has a low concentration of seniors throughout the neighbourhood.

The Orden

Before the Second World War, The Orden hardly had any building regulations in place, generating a diversity of housing types throughout the neighbourhood like a mosaic (Majdandzic & van Oosterom, 2014). Only after the War, the municipality took more control in the expansion process of the neighbourhood, introducing the Laan van Spitsbergen (see map 1) as part of the ring road around the city. They started renovating housing piece by piece, honouring the mosaic layout that had formed throughout the years. The diversity of housing has generated a very diverse population within the neighbourhood: social housing is located right next to middle class housing and both seniors flats and terraces housing for the low and middle class are plentiful. As a consequence, people of all ages live here, but the income remains below average compared to other districts in the district of West. (Allecijfers.nl,2019b). It has become the most populous neighbourhood of Apeldoorn with almost 6400 residents (CBS, 2019b) of which 648 (10,1% of the total population of Orden) people are considered seniors above the age of 75 who live independently.

Most housing is concentrated at the west side of the Laan van Spitsbergen, which divides the neighbourhood (see map 1). Located in the centre, alongside the Laan van Spitsbergen is the Ordenplein: the heart of this neighbourhood. It accomodates a supermarket, several shops, a pharmacy, doctor and has two community centres next to it. Another community centre is located within a senior flat named Mandala. Both residents and non-residents are welcome here. Several sports facilities are present in the east of the neighbourhood (see map 1), that offer football, hockey, athletics, scouting and several other sports.



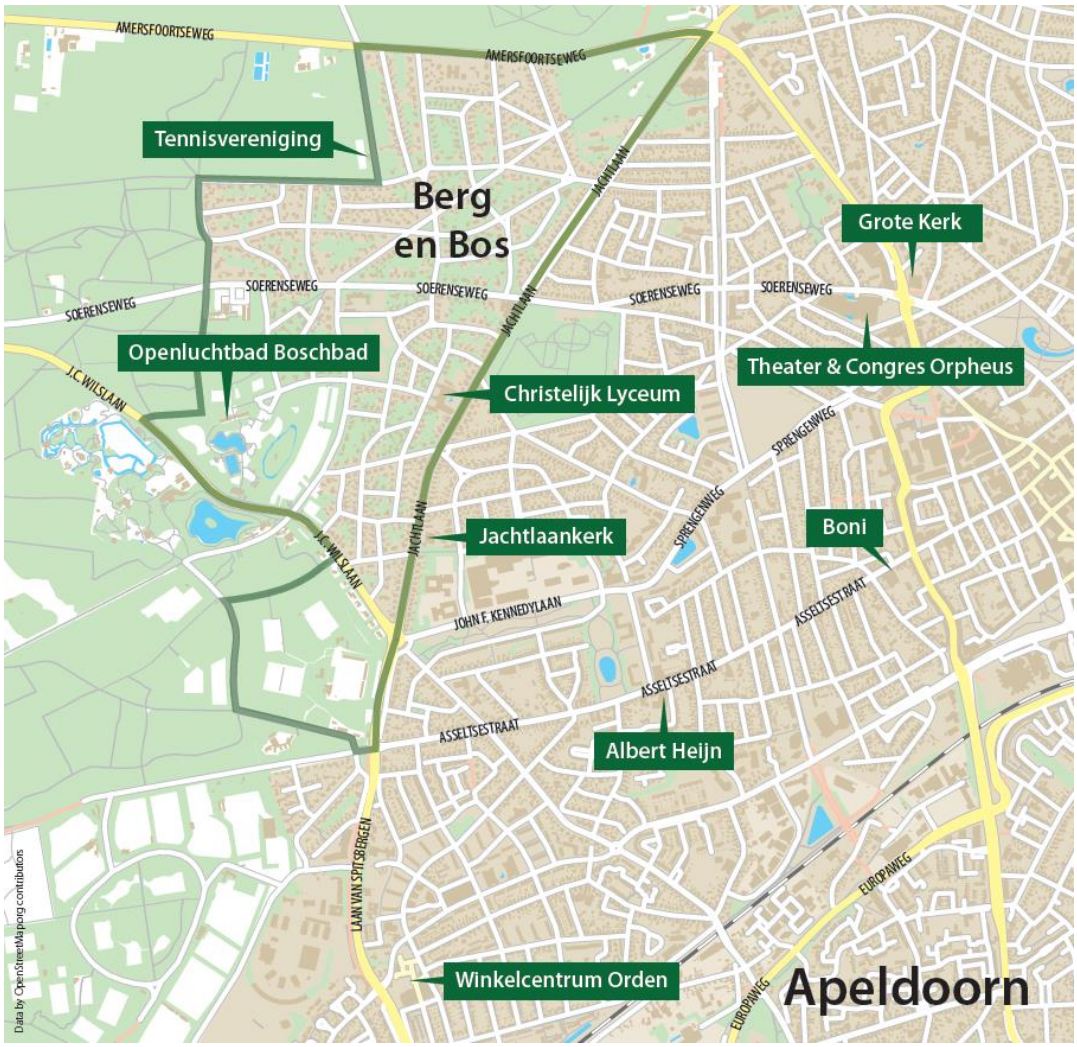
Map 1: The neighbourhood of de Orden including important destinations. Source: Blokplan, 2019

Berg en Bos

In Berg en Bos, the first villas appeared at the beginning of the 20th century, after the original estate owner had passed away. To ensure this newly build neighbourhood would appear cohesive, the municipality bought the estate as a whole (Majdandzic & van Oosterom, 2014). Architects ensured that Berg en Bos would be developed in harmony with its surrounding nature and the residents could enjoy maximum privacy: the roads meander like rivers through the neighbourhood, a multitude of trees were replanted along these roads as well as on the building plots to maintain the feeling of living in a forest. Because the municipality is devoted on keeping the neighbourhood as green as possible, land owners must get a permit (which are not given out easily) to temper with the greenery on their land (Majdandzic & van Oosterom, 2014).

The demography of this neighbourhood is therefore noticeable different from a neighbourhood like Orden. The neighbourhood has the highest average income of the whole city with €47.300,- per year (Allecijfers.nl, 2019a). Furthermore, most residents are 45 years or older. A total of 287 seniors (13,9% of the total population of Berg en Bos) live here that could be considered the research population.

In map 2, the neighbourhood of Berg en Bos has been highlighted. First of all, the Jachtlaan is a noticeable border of the neighbourhood at the west. This main road forms a ring around the inner city, separating the neighbourhood from the rest of city. Another main road is the Soerenseweg, crossing from west to east through the neighbourhood. This is the only road which does not uphold the 30km/hour speed limit like the rest of the neighbourhood. Because there are very few facilities in the neighbourhood, there is little non-destination traffic, which contributes to the privacy and peace that the municipality has set out to create. There are some recreational facilities such as the outdoor swimming pool, a football club, hotel and tennis court spread over the neighbourhood, however 'basic' facilities such as a supermarket, doctor, pharmacy or other shops are absent. Due to the broad layout of the neighbourhood, consisting predominantly out of villas, with one senior residential flat and a few bungalows, only 2060 people reside in the neighbourhood (CBS, 2019b).



Map 2: The Neighbourhood of Berg en Bos including important destinations. Source: Blokplan, 2019

Destinations

During the interviews, a total of 43 different activities have been mentioned by the respondents. The most commonly activity is going to the supermarket, in which the supermarket at Ordenplein is visited the most by respondents from both neighbourhoods (marked in map 1 and map 2). The next most mentioned activity is visiting family, followed by visiting the city centre, going to the hairdresser, taking a stroll and attending church. The first two activities (Supermarket and Family) are likewise the most important places respondents wish to visit. When asked at the end of the interview which activity was

most important to the respondent, most automatically assumed it was about importance of 'survival' rather than emotional importance. Therefore, the supermarket has been opted as crucial by most respondents. Several respondents living in Berg en Bos have shared their concerns about this important activity: they visit the supermarket by car and are concerned by the idea they might not be able to get their groceries in the future if they are become unfit to drive. The emotional important activities are most often related to visiting family or them visiting the respondent. This depended strongly on the mobility of the respondent as well as the ability of family members to visit.

Ten of the fourteen respondents have lost their partner and now live alone. These respondents seek out social interaction more (except for R5) than the respondents who still have a partner. An interesting observation is that respondents seek these interactions during other activities: they lose interest in the actual activity but use it to fulfil their social needs. For example, a visit to the gym is not just about staying healthy: the coffee and chitchat afterwards have become much more important to R4, R9 and R10. Another respondent (R8) will stay longer at a supermarket to ask employees to find products for him, not because he is unable to find them, but because he wants to interact with these people. Four respondents still attend church, but only one respondent does so purely for his religion. The other three respondents also seek the company of others. The four respondents who still have a partner value this social interaction differently among each other. R4 undertakes several activities without her husband to have some variety in the people she meets. She values the visits to the gym and the community centre as most important to her daily life, because they fulfil her social needs. Contrary to this view, another respondent (R7) does almost nothing without her husband because he is unable to live alone, but she prefers it this way and does not feel the need to do things without him.

At some point in the last couple of years, all respondents have brought at least one activity home: instead of traveling to a specific activity, the activity would take place at the respondent's house, reducing the need to travel. These activities differ from grocery deliveries, hairdressers, doctor appointments, physical therapist visits and food delivery. Especially respondents R1, R2, and R3 have moved most activities into their homes, living in a special care centre: still independent, but with the option of assistance if needed. The hairdresser is an activity brought home most often, also among respondents whom still own a car, cycle or are able to walk a longer distance.

An observation made on the mental maps, is the difference in the perception of activities within or around Apeldoorn and activities in other cities. The activities in other cities always relate to visiting family or friends. Activities within or around the city of Apeldoorn are being drawn relatively close to the centre of the map, indicating a more accessible activity, while the activities in other cities (more than 20km) have been drawn to the most outer parts of the mental map (See Mental Map 9, 11 and 13 in Appendix 7). Exceptions were made when family members themselves are able to pick up the respondents and these cities were drawn a little closer to the centre of the map. When asked how the respondents perceive the accessibility of the places they have drawn further from the centre (e.g. Den Haag, Groningen, Schiermonnikoog, Hellevoetsluis), they are not particular negative about their accessibility, even though they wrote them down at the far sides of their map. This indicates an exaggeration of the respondents while drawing the mental maps.

4.2. Activity Factors

4.2.1. Related to Activity

There is a clear hierarchy between indicators which have been mentioned more than others by the respondents of this research and two new indicators have been introduced based on the answers respondents have given.

The most grounded indicator of 'Related to Activity' is the indicator *Atmosphere.* Nine respondents claim the *atmosphere* as something that makes an activity either enjoyable, or not. The a*tmosphere* of an activity seems to be strongly related to the social interactions the respondents have during these activities. R4 joins the gym activities to remain mobile, but the gym activities are not half as important as the atmosphere during the gym itself: "Sometimes we do nothing but coffee drinking and chatting." She laughed.[1] This may not have been the official goal of the activity, but it is the real reason she returns every week for another session. This behaviour has been observed with seven respondents: repeating activities weekly or monthly due to the great *atmosphere* at these activities based on social interactions. Even the respondents who do not wish to participate in social activities, do wish to be near these activities because of this positive atmosphere. R5 explains his point of view: "I like to watch people, but preferably from a distance."[2] The *atmosphere* of activities is furthermore related to the *interior design* and *landscape design* (Related to Design) of these activities according to R5, R9, R12 and R13. These respondents either perceive negative vibes from these activities such as 'cold and massive or 'a cramped' while describing a church or shop. Positive vibes are experienced through the *interior design* of a library or the *exterior design* of shops in smaller villages around Apeldoorn. Another interesting observation has been that respondents only perceive *atmosphere* to be important for leisure activities, but not for the more necessary activities such as grocery shopping or visiting a doctor/hospital. The respondents appear to seek out the activities where they perceive a positive *atmosphere*, while they avoid activities (or search for alternatives) that have a negative *atmosphere*. This most often related to the other people attending these same activities.

Three indicators seem to be interconnected with each other even when respondents do not link these specific indicators to each other themselves: *Quality of products*, *Size and Scale* and *Ownership* have been linked together by four different respondents. They visit specialized / locally owned shops for specific products such as cheese, meat, bread and clothing because these shops provide a certain quality that (in their eyes) a chain-store such as a supermarket or clothing store is unable to provide. "I prefer to buy clothes somewhere halfway. There are several wonderful shops with high quality goods."[3] With these words, R13 refers to his preference for locally owned shops over the chain-stores that have 'flooded' the city centre. It is remarkable that except for one respondent (R8), none of the respondents differentiate their supermarket preferences based on *quality* between them or let *distance* (Impedance) decide their choices. Instead, indicators such as *Familiarity* (New indicators, Related to Activity) and *the mix of Activities at site* (Related to design) have a greater influence on choosing a supermarket.

Another interesting indicator is the *hours of operation* of an activity. Based on the coding of the interviews, this indicator has only been mentioned a few times, suggesting little influence on the respondents' decision to participate in an activity or not. Nevertheless, most respondents do not leave their house after dark. As such, several activities are therefore inaccessible to them without taking

[1] Original translation: "soms doe je niets, en zit je alleen maar te kletsen en koffie te drinken." (R4)
[2] Original translation: "Ik zie graag mensen, maar houdt ze wel op afstand." (R5)
[3] Original translation: "Kleding koop ik veel liever halverwege ergens. Daar heb je een paar hele goede winkels met kwaliteitsspullen." (R13)

precautions or receiving help from others. R7 wears a safety vest when walking her daily round with her husband, R12 no longer drives at night and R10 only leaves her house after dark when she is being walked home by her daughter or son-in-law. In order to participate in activities during the evening hours, they are dependent on pick-up services from their family members or taxi-services.

While not part of theoretical framework, some indicators have been opted by the respondents with such a frequency they appear to be important influencers. One of these indicators (already mentioned above once) is the *Familiarity* of an activity/location. This indicator relates to the respondents making choices based on their familiarity with a specific activity or location. Several respondents explain that they remain loyal customers to specific shops even though alternatives have been presented. R7 explains she does not shop at the supermarket near her home but at one further away: "Because the Albert Heijn has been there for a shorter period of time. The Boni has been here for over 30 years, so I have been going there for the last 30 years.".[4] Her habit of traveling to this specific supermarket is also related to her *combining her trip with other activities along the route* (New indicator, Related to Design).

Another new indicator is the availability of *different products/ services.* Respondents have announced their choice in for example supermarket will differ, depending on special offers or specific products which are not available at another store: "That is why I visit both supermarkets. The Albert Heijn sells different goods than the Boni does." R7 explains.[5] Furthermore, two other respondents (R6 and R10) switch between supermarkets because their special offers contain non-food products or they wish to buy some different snacks available in one or the other supermarket.

During the interviews, some respondents (R3, R5, R7, R12) indicated that they avoid *crowded* activities. Some (R3 and R5) appeared more comfortable with being alone and only wish to experience crowds from afar. Other respondents (R7 and R10) find themselves conflicted between wanting to visit activities such as the market or a festival, but are being confronted by the *crowds* they are no longer comfortable with being in. As a result, both respondents no longer visit these places, or only travel when the crowds are less.

There are three indicators (*price of products, customer recognition* and *facilities*) in this sub-factor that exerted only a small impact or none at all on the respondents. Respondent R8 and R13 have suggested they look at the *pricing of products,* respectively groceries and petrol pricing. However, in both cases the respondents clearly state that other indicators play an important role in their choices and pricing is more a convenience rather than an actual deal breaker.

4.2.2. Related to Design

This sub-factor is represented by six indicators. Two indicators have a strong influence on the respondents, while they themselves do not seem to realise this. The first indicator is *mix of activity at site*. Nine out of fourteen respondents have indicated that *mix of activities* at a specific location influences their decision making. For daily shopping this availability of different shops is important to respondents. This makes the small shopping centre Ordenplein a popular destination for the respondents of both neighbourhoods. "It has a doctor, pharmacy, it has it all. That is all Ordenplein."[6] is how R11 explains the use of this shopping centre, even when there is another supermarket closer to her house. Some respondents are even willing to drive further to find the right cluster of activities, such as R12 who will drive to a shopping centre in the South of Apeldoorn as it contains a Kruidvat, Blokker and HEMA next to the normal supermarket.

[4] Original translation: "Omdat de Albert Heijn daar korter zit. De Boni zit er al 30 jaar en daar kom ik ook al 30 jaar." (R7)
[5] Original translation: "Daarom kom ik ook bij beide supermarkten, de Albert Heijn heeft andere dingen dan de Boni." (R7)
[6] Original translation: "Daar is de huisarts, de apotheek, dat kan dus allemaal. Dat is allemaal Ordenplein." (R11)

The second important indicator is the *density of activities at site.* This indicator has not been frequently noted by the respondents, but does seem to have an imperative influence whether they will visit a specific location or not. Respondents often refer to the city centre's shopping street, but in a negative connotation. "If you still want to do other shopping, you have to cross the whole shopping street."[7] says R13. Many respondents have health issues, which makes it difficult to walk these distances in the pedestrian area of the city centre. Hence a low density of activities (although with a great mixture) is perceived as a large barrier for the accessibility to those respondents with health issues. Therefore the indicator *density of activities at site* is important, but seems strongly influenced by *execution of actions* (health).

One new indicator of this sub-factor is *combining activities along the route*. This related to the respondents participating in specific activities because they are located on the route to another activity. While not a crucial indicator, this could be seen as participating out of convenience. R14 visits another baker, depending on the route he takes to the city centre and R13 visits different petrol stations depending on where he is going. This is also valid for R6, R7 and R10, whom link an activity with visiting specific friends, depending on the place they are going.

The respondents use different modes of transport such as bicycles, scootmobiles and cars which require parking facilities to get to an activity. The five respondents with bicycles or scootmobiles do not mention parking facilities as an indicator (nor negative, nor positive) for their accessibility, whereas four of the six car drivers explained that parking facilities are really important for their accessibility. They or their partners are not able to walk long distances, thus they wish to park as close to their destinations as possible. These four respondents are in possession (or are in the process of obtaining) a disability parking permit. This indicator is thus only influential for seniors who also have difficulty with the *execution of actions* (Health).

Also within this sub-factor, there are two indicators that have been mentioned by the respondents only a few times. The *atmosphere* outside of the activities does not seem important to the seniors who have participated in this study. One respondent mentioned the square of Ordenplein being cosy, suggesting this indicator does influence her, but she corrected herself that it was not cosy, but rather the *mix of activities at site* were appealing to her. The last indicator *landscape design* has been linked to *atmosphere* (Related to Activity) of the activity itself, but only has been mentioned by R5, who explained he really liked walking through the neighbourhood of Berg en Bos, because of its *landscape design*.

4.3. Transportation Factors

4.3.1. Impedance Factors

The indicator *distance* has been mentioned most (61 times) by the respondents. It can be stated that *distance* is one of the most important indicators for the respondents. Moreover, the value respondents attach to *distance* is unconditionally bound to the indicators of 'Health' and 'Social Network' (sub-factors of Personal Factors). This can be explained as follows: the way respondents value *distance* is dependent on the mode of transport they are able to use. The available modes of transport are consequently bound to the *health* (Personal Factors) and *social network* (Personal network) of the respondents. Especially respondents limited to active modes of transport (walking and cycling) or who are dependent on pick-up by family or taxi, value *distance* as crucial. Respondents who drive to their daily activities by car or scootmobile value *distance* as a nuisance rather than a crucial go/no go influencer. The respondents who are still able to drive (six out of fourteen), perceive *distance* much less

[7] Original translation: "Als je dan nog boodschappen moet doen, moet je die hele winkelstraat inlopen." (R13).

influential for their accessibility. It is interesting to understand that five of the six respondents with a car lives in Berg en Bos, while only one lives in the Orden. “Currently, our accessibility is great. We can go wherever we wish to because I am still able to drive a car.”[8] Is the explanation of R7. Two of the respondents (R6 and R11) admit they are no longer comfortable driving to all their activities, but due to living at a distance, they continue to do so. Respondents who dislike driving perceive *distance* as more important than the respondents who enjoy driving more.

The respondents who are limited to active modes of transport experience *distance* as important, although for different reasons. R1, R2 and R3 live in the same building, about 500 metres away from the Ordenplein, but they all have severe difficulty with walking such a distance. R1 says: “The supermarket is extremely far away.”[9] However, she lives at the same distance from Ordenplein as R4 and R10, who perceive the supermarket as rather ‘nearby’, but they have less difficulty with walking. This clearly indicates a relation between *distance* and *execution of actions* (Health).

Two other indicators are also related to *distance* and the mode of transport respondents use: *in-vehicle time* and *out-of-vehicle time*. Interesting is especially that *in-vehicle time* is important to those who use the public transport. In Apeldoorn, the bus system has been organized in in a way where all busses go to the central train station and back. A trip from Northeast to East requires the user to travel to the train station before getting on a bus in almost the same direction back. This results into longer *in-vehicle times* than when the route would have been directly from Northeast to Southeast. This links this indicator to *directness of route* (Level-of-Service). The *out-of-vehicle time* is important to the respondents who have difficulty getting from their vehicle to their activity and the amount of effort this takes: “last time it took us over an hour. So next time, we will bring a wheelchair.”[10] says R4. With the help of a disability parking permit, four respondents have resolved their complications with the *out-of-vehicle time.* This indicator is therefore strongly related to *parking facilities* (Related to Design).

The *topography* of both neighbourhoods is rather different, but this hardly influences the respondents currently. Three respondents have explained their struggle with topography is based on cycling. Especially in Berg en Bos, there is a difference in altitude of over 30 metres, which can be experienced as troublesome. All three respondents have issues with their health: “Only cycling uphill is enough for my knee to say ‘bye’ and he is done.”[11] R8 refers to his knee being unable to handle the stress of cycling uphill. Currently, all three respondents have found a solution around the barriers they faced, having switched to an e-bike or stopped cycling altogether to avoid fatigue or other health issue to arise again.

The last indicator of this sub-factor is *costs*. This indicator has not been mentioned once by the respondents during the interviews.

4.3.2. Level-of-Service Factors

This sub-factor contains the most indicators of all sub-factors and on average has the most indicators with a high frequency of being grounded by the respondents. This indicates seniors value these indicators as more important than the indicators of other sub-factors. However, several of these indicators function as a nuisance/luxury rather than a crucial influencer to the respondents.

[8] Original translation: ““Nu is het wel zo dat onze bereikbaarheid momenteel wel goed is. Daar waar we heen willen, we nog heen kunnen want ik rijd nog auto.” (R7)
[9] Original translation: “De supermarket is echt heel ver weg.” (R1)
[10] Original translation: “Vorige keer deden we er een uur over. Volgende keer gaat de rolstoel mee” (R4)
[11] Original translation; Als ik maar iets tegen een heuvel op fiets, dan zegt mijn linkerknie ‘daag’. Die doet het niet meer. (R8)

The most grounded indicator is *Vehicle design*. Seniors have various experiences with the *vehicle designs* of cars, busses, trains, bicycles, scootmobiles or rollators. R1 told the researcher that she has not used the bus in several years and explains why: "no, I really hate it, and I am no longer used to it. I can no longer get into the bus."[12] Yet, another respondent (R11) explains that she is really comfortable getting in the bus because of the low step-in the bus provides, which makes it easy for her to enter the bus. Two things stand out from their different point of view on the bus: R1 has not used the bus in several years, or any other form of public transport for that matter, because she believes the bus is inaccessible, while R11 confirms this the bus has been designed in such a way this is actually accessible. For both R1 and R2, this indicator is a go/no go influence on their use of public transport, while other respondents perceive the design of the bus more as an inconvenience or positive addition. Another observation has been that several respondents who still cycle, have considered the use of an electric bike to overcome exhaustion (Health). Vehicle design can also relate to the tools seniors have to travel about. Especially rollators and canes are considered useful tools to help the respondents cross short distances.

The *directness of route* is an indicator linked to *in-vehicle time* (Impedance) by the respondents and is most often mentioned by respondents using public transport. R11 and R13 complain about the system of busses: "It takes such a long time and you always have to travel via the train station. That is somewhat a good idea of course, all busses passing the train station. But when you need to go to the hospital…"[13] (R11). When asked if R11 is able to attend church using the bus, she replies: "No.. well, there might be a bus, but then you first need to go to the train station."[14]. R12 and R13 face the same barrier to attend their church with the bus, especially because with their car it only takes five minutes to get there. The indirectness of the bus system of Apeldoorn is seen as an inconvenience by the respondents, which directs the respondents to use other modes of transport rather than the public transport. R13 explains furthermore that if a bus line does not directly pass the activity he wants to visit, he will take his car.

Within this sub-factor, the following indicators can be linked together as well: *Service frequency, continuity of route* and *hours of operation*. To the respondents of Berg en Bos, this link is especially important. On Sundays, the bus drives once an hour to the bus stop of Apenheul, which is a distance the respondents of Berg en Bos are not comfortable walking. The *service frequency* influences the *continuity* of their journey as well, because the different busses and trains often do not correspond to each other and force respondents to wait at the train station for some time. This is an issue on Sundays for R11. Several respondents have explained their preference for Valys over the public transport system, because of the *continuity* of the journey.

The last indicator that has been grounded a few times is *volume/crowding*. Not only at the specific activities itself do respondents prefer peace, but this is also important at train stations for two respondents. R11 and R12 explain their discomfort when they have to transfer between trains at larger train stations such as Utrecht or The Hague. The *size* (Related to Activity) and the *crowding* of these train stations is too exhausting for them, both physical and psychological.

It is interesting to see that the indicators influencing the physical surroundings such as *benches, shelter* and the *facility widths* are not considered to be important to the respondents. Except for one respondent (R10), the respondents have 'worked around' barriers they found: Some bring their rollator with them so they can rest whenever they need to. On the other hand, R10 only makes specific trips

[12] Original translation: "Nee daar heb ik een hekel aan, dat ben ik ook niet meer gewend. En ik kan de bus niet meer inkomen." (R1)
[13] Original translation: "Het neemt ontzettend veel tijd natuurlijk en je moet altijd via het station. Dat is op zich een goed idee natuurlijk, alle bussen naar het station. Maar als je naar het ziekenhuis moet…" (R11)
[14] Original translation: "Nee. Nou, hij zal wel rijden, maar dan moet je eerst naar het station." (R11)

when she feels 'good' enough to walk these trips in one time, when she knows there are no resting places.

The last three indicators are related by 'information': S*ignalisation, Signage* and *Information availability.* These three indicators have not been grounded regularly by the respondents in the sense of these indicators influencing their accessibility. The respondents appear to be not well informed about for example the availability of busses and the ease these busses can be entered (See quotes at *vehicle design)*. Simultaneously the respondents appear reluctant to put effort in becoming more informed. Respondent R10 suggests she has trouble with requesting a Valys subscription, but explained she will wait for her daughter to solve this. Other than this, the respondents have not mentioned these indicators.

4.3.3. Terminal Factors

This sub-factor has not been grounded often by the respondents, but valued more by the respondents than most indicators of Level-of-Service or Comfort. Only seven respondents use the public transport sometimes, which can be explained by the barriers respondents face within this sub-factor.

The *terminal locations* are most often perceived as barriers by the respondents of this research. The locations of bus stops are notably important in the city centre for the respondents still using public transport. Their locations, and the bus line going to these locations are crucial, especially because the respondents do not like to switch busses: they prefer a *direct route* that brings them to the places they wish to be. The *distance* seniors need to walk to and from the bus stop is almost as important: "I would have to take the bus. But I would also have to walk a great distance, so I just do not go."[15] R10 expresses she is unable to walk the 650 metres from the bus stop to the museum. Therefore she avoids specific activities in the city centre, when the bus is unable to bring her closer to these activities. She (R10) is not alone because R13 explains he only takes the bus when his destination is almost directly next to the bus stop. If he needs to walk further, he will take his car and use his disability permit to park close by.

The *intermodal connections* are only important to respondents using different modes of transport. This includes only three respondents and this indicator is often seen as an inconvenience due to the lack of *continuity* of their journey. R12 blames her age: "Several years ago you could do this with ease, but now things are no longer that easy."[16] She refers to her heart- and hip issues which makes it difficult to hurry to a train or bus. The time transfer to a train is by all three respondents perceived as too short, thus forcing them to hurry or wait for a lengthy period of time before the next train arrives.

The *availability of parking* and *parking costs* are interconnected indicators. There is only one respondent (R11) that makes use of parking at a train station, which she has chosen specifically because of the free parking. The respondents who predominantly use their car to travel (R7, R12 and R13) rather drive directly to their destinations instead of taking public transport.

Most respondents have a rather negative view of using public transport in Apeldoorn. The most influential indicators for this appear to be *directness of route* (Level-of-Service), *continuity* (Level-of-Service), *terminal locations* and for some the *vehicle design* (Level-of-Service). This negative association with public transport can explain why overall, Terminal indicators have such a low frequency of being mentioned by the respondents. The availability of alternative and more comfortable modes of transport, and most importantly the availability of taxi-services for both short- and long distance travel.

[15] Original translation: "En dan zou ik met de bus moeten. Maar dan moet ik ook nog een heel eind lopen, dus dan ga ik maar niet." (R10)
[16] Original translation: "Zoveel jaar geleden deed je het allemaal met gemak, maar ik doe de dingen nu niet meer zomaar met gemak." (R12)

Ten respondents make use of the Valys, which allows the respondents to bypass the need to transfer between several modes of transport, which has already been noted to be something the respondents wish to avoid.

The final indicator of this sub-factor is *Terminal design* has only been mentioned once by respondent 9. She feels uncomfortable, or rather insecure while waiting at the train station of Apeldoorn, partially because of its 'cold' design, but also due to the *absence of police/security* (Comfort). However, this does not stop her from using the public transport system, which she perceives as ok. Therefore, this indicator seems to have a negligible influence on the perceived accessibility of the respondents.

4.3.4. Comfort Factors

The most grounded indicator is *weather.* Unsurprisingly, the respondents using active modes of transport value weather as more important than those who drive a car: "sometimes when the weather is bad, I just take the car."[17] This way, R8 works around the barriers of bad weather during travelling to activities. He furthermore explains that he avoids activities outside during bad weather because of his *health.* The season is another crucial influence to the respondents: during winter, four respondents are hesitant to leave their house, afraid of falling due to ice forming. R10 explains that during the winter months, she stores food for at least two weeks, just to be safe. While the 'bad' weather circumstances are considered crucial to some respondents to participate in activities, the 'good' weather is considered more of a luxury, less crucial to the participation.

In the study of Risser et al. (2010) *conflict with other modes* and *other users* are considered as influential indicators because the number of barriers seniors face considering these two indicators. It is striking that none of these barriers have been confirmed by the respondents of this study. R11 is the only respondent to face a conflict with other users, because pool visitors parking in front of her garage during the summer periods. Other respondents have not acknowledged positive or negative influences by either of these two indicators, suggesting they are unimportant to the respondents. She (R11) furthermore complains about the fast traffic passing by at the Soerenseweg, where you have to walk on the same road because there is no footpath.

The next indicator is *the presence of police/crime* which indicates the feeling of safety of the respondents. Three respondents have remarked the feeling of safety of two situations: they do not go outside after dark due to the feeling of safety. And two respondents explain they feel uncomfortable when waiting at the train station (this is linked to *terminal design*). R9 attributes her fear here to the news she watches regularly and her feeling of being unable to walk away or defend herself.

Two interesting indicators are *traffic speed* and *traffic volume*. Both indicators have been mentioned only a few times, but the indicator has great impact on the respondents who have acknowledged these indicators. First of all, car drivers value both these indicators as important: they perceive fear of getting into an accident on the highway due to the amount of traffic and the speed they are driving. Out of six respondents, four (all female) admit they are no longer comfortable driving on the highways, especially not to the West of the Netherlands. This side of the country is considered busier and therefore considered more dangerous by these respondents because they feel like they might not respond fast enough to situations (o*bservation skills*, Health). These two indicators are therefore experienced as a barrier stopping them from traveling to specific locations. However, R6 purposely takes the highway once in a while to remain familiar with it. Interesting is that for two of these respondents, the children have pushed their mothers to stop using the highway afraid their parents will create an accident. A second barrier on *traffic speed* is based on the high speed limit on the main road of Berg en Bos. Its

[17] Original translation: "Soms als het slecht weer is, pak ik de auto."(R8)

limit is 50km/h, but without a sidewalk, pedestrians are forced to walk on the same road. This creates an unsafe feeling for R11, but two other respondents walking along this road have not acknowledged this to be a barrier.

The last four indicators have a common theme: they are based on the physical environment the respondents perceive: *shade, scenery, lighting* and *cleanliness.* This last indicator has not been mentioned once, either suggesting that this factor does not matter, or the current state of cleanliness of the places the respondent travel to are satisfactory. The other three indicators have been grounded respectively once, thrice and twice. While this says nothing about their importance, the respondents value these three factors as either nuisance or luxury. R6 complains about the lack of commotion in her neighbourhood because it becomes dark and quiet in the evening, but at the same time, this is exactly what she likes about her neighbourhood.

4.4. Personal Factors

4.4.1. Health

The target group of this research are seniors from the age of 75 years old who live independently. This population group has been chosen beforehand because from this age on it is expected that these respondents face a certain degree of mobility deterioration but can still care for themselves.

Execution of actions

All fourteen respondents have encountered some sort of limitation in their ability to execute specific actions. The impact of this indicator is especially influential on the active modes of transport of respondents as their ability to execute these actions becomes limited.

When cycling becomes more difficult for the respondent, there are several alternatives to ensure the respondent can still travel about. It is therefore no surprise that cycling is abandoned more than driving or walking. Six respondents have mentioned that they have stopped cycling because of a barrier: some lost their balance and fell over their bikes, while others no longer have the fatigue or have joint issues to cycle. The loss of cycling is therefore most often related to *the execution of actions*. As a result, two indicators are influenced according to the respondents: *topography* (Impedance) becomes more important due to the increasing difficulty to cycle uphill. This is both important to a respondent in Berg en Bos and one in Orden. The second indicator is *vehicle design:* several respondents have taken up a e-bike to bypass difficulties with *executing actions* and *topography* barriers. It is interesting to observe that the respondents who have lost their ability to cycle, have adapted their current lifestyles in such a way that they are satisfied with their current abilities. R12 has lost all interest in cycling: "I have not cycled in years and have been driving my car for years. I feel much safer in my car."[18] Also R8 has happily replaced his bicycle for a scootmobile, in which he is much 'more comfortable.' R9 is the only one who was upset not being able to cycle, but is now in the process of learning how to cycle again and is therefore satisfied with her current situation. Their ability to find alternative modes of transport as opposed to cycling to get to activities, suggests that this indicator has a low influence on the perceived accessibility, but does influence the mode of transport the respondents use.

Walking has become more difficult for almost all respondents over the years. Unlike with a bicycle, there are not many alternatives to turn to as this becomes more difficult. 10 respondents have turned (permanently) to the use of a rollator when walking became more difficult. Based on the interviews, a decline in the ability to walk has much more influence on other indicators than the decline of cycling has. It has become clear that this indicator strongly influences the *distance* (Impedance) a respondent

[18] Original translation: "Ik fietste al jaren niet meer en ik rijd al jaren auto. En dan voel ik mij in de auto veiliger…" (r12)

is able to cross. Respondents indicate that *distance* (Impedance) becomes more important as their ability to cross it, becomes smaller (See paragraph 4.3.1. Impedance) This indicator furthermore influences *density of activities at site* (Related to Design), *parking facilities* (Related to Design), *Relation Family* (Social Network)*, Relation Others* (Social Network)*, Living Situation* (Social Network), *Benches* (Level-of-Service), *Weather* (Comfort*), Pavement Condition* (Comfort), *Out-of-Vehicle time* (Impedance), *Vehicle Design* (Level-of-Service), *Terminal Locations* (Terminal). This list suggests that the ability to walk is extremely influential on other indicators that determine the accessibility of a person. "Life becomes more compact"[19] is how a respondent (R2) explains how her world has become smaller now she is unable to walk distances. Yet, she appears satisfied with her current abilities to perform specific activities, especially because she does not need to travel to them, but most are being held at the location she lives. Another respondent (R4) is more nonchalant about her world becoming smaller. She shrugs: "You know, if this does no longer work, we can always take a taxi-service."[20] She (R4) refers to her and her husband's ability to walk and cycle to most of their activities. This indicator influences many other indicators for the respondents who have difficulty walking and therefore has a greater impact on the accessibility of a person. With most respondents, activities are still reached and only when walking becomes too difficult, respondents (R1, R2 and R3) will cease to attempt to get to specific activities such as the supermarket. These respondents have found alternatives through food delivery or family doing their groceries, and after getting used to their situation, they seem to accept it.

Decision making

The second indicator is based on the ability of a person to process information and give a response to it. New situations as well as familiar situations respondents have not seen in a while, are met hesitantly. Several respondents have not taken the bus in several years, refuse to believe they could use the public transport system after all these years of not doing so: 'It is too difficult to enter the bus, they are afraid they will fall in the bus, the bus is never on time and it is too exhausting to learn how to use the ov-chip card'. These are a grasp of reasons given by the respondents who have not used the public transport in several years, while other respondents have very positive experiences with the same buses, being able to get in easily. The same respondents who have quit using the public transport (R1, R2, R8, R12, R13 and R14) have alternative modes of transport they are currently comfortable with using. New situations are also met with some resistance, especially in Berg en Bos. The current bus line might be terminated, which four respondents greatly disapprove of, but none actually use the bus line themselves. They are more concerned for the accessibility of their neighbours. In exchange for terminating the bus line, rumours about a 'call-bus' have travelled through the neighbourhood, but the respondents in Berg en Bos have little faith in this new system they are unfamiliar with. Two respondents were explained how this new system could look like and how it would operate. At first the respondents (R12 and R13) remained sceptical, giving several arguments about the current taxi-services from the hospital, but they did admit they really did not know anything about the call-bus, and could not give actual arguments against it, it was just unfamiliar.

It is interesting to see that the respondents perceive their accessibility being strained when the bus is terminated, but they indicate they will find alternative modes of transport to get to their activities. The influence of this indicator on their perceived accessibility is therefore limited as it essentially only influences the use of public transport in a negative way, which the respondents are able to overcome. It furthermore influences the following indicators: *information availability* (Level-of-Service), *signage* (Level-of-Service), *Signalization* (Level-of-Service), *Relation family* (Social Network).

[19] Original translation: "Het wordt wel beknopt." (R2)
[20] Original translation: "Nou weet je, als dit niet meer kan, dan bestaat er een busje en gaan we die inschakelen." (R4)

Observation skills

The last indicator concerns the *observation skills* of the respondents. This is based on the ability of respondents using their senses such as eyesight and hearing. Based on the interviews, the respondents have not experienced the loss of hearing as an influence. On the other hand, eyesight has been influential, especially on respondents with a car. In paragraph 4.3.4. Comfort Factors has been explained that some respondents have become uncomfortable to drive on the highway due to the *speed* (Comfort) and *crowding* (Comfort) on these roads. They are afraid their sense will fail them and their senses will fail them and they will cause an accident. Due to the deterioration of her eyesight, R10 has stopped driving altogether, but cannot go outside alone at night either because she has lost half her sight and is now unable to identify the depth of objects such as a curb or a bump in the road. Two other respondents (R11 and R12) also have more difficulty with their eyesight during the nights and therefore no longer drive at night. It is interesting to see how these three respondents have changed their lifestyle around this limitation as if it is a given, rather than a barrier on their lifestyle. The respondents living in Berg en Bos who still drive (R6, R7, R11, R12 and R13) are very concerned about their future, because they all perceive their car as essential to live in Berg en Bos. R11 explains that once she is unable to drive anymore, she can no longer live in the neighbourhood. While these five respondents are still able to drive now, this ability to drive (thus this indicator) will influence their ability to participate in activities.

This indicator seems to influence especially the ability to drive due to eyesight deteriorating. There are a few other indicators that become more important to the respondents as their ability to observe declines: *lighting* (Comfort), *Relation family* (Social Network), *distance* (Impedance), *traffic speed,* (Comfort), *traffic volume* (Comfort) and *pavement condition* (Comfort).

4.4.2. Social Network

Living situation

The *living situation* of the respondents has been influencing the respondents in their ability and wishes to participate in activities. It relates to the respondent's partner and how their way of living together (or not). Overall, the respondents who still have a partner (R4, R7, R12 and R13) feel less of a need to participate in social activities than the respondents who have lost their partners. R7 is the caregiver of her husband and almost does not leave the house without him, but she does not mind giving up her 'freedom' to take care of him: "You share love and loss."[21] She shrugs. On the other hand, a respondent (R4) does feel a little trapped in her *living situation* because her husband does not like to leave the house much. Because he is also unable to take care of himself, R4 needs an outlet such as the gym or the community centre. When she participates in these activities, she always ensures this is coordinated with his schedule so he is never left alone too long. As explained before in paragraph 4.1. Destinations, respondents who have lost their partner and live alone, tend to seek more interaction outside their house and attempt to participate in more activities. Three respondents live in a complex for seniors, which has a community centre within the building and provides certain services such as grocery shopping and health care to be handled for them if they wish. They feel less need to get outside, because they feel they have everything at their disposal.

When the respondent's partner's health deteriorates, or when they lose their partner, certain activities will cease, even though the respondent is physically still able to perform them. The respondents explained that most of these activities were always done together, but have lost their appeal when this

[21] Original translation: "Je deelt lief en leed." (R7)

was no longer possible. “I once thought, we could cycle there and maybe there, but that never happened.”[22] Explains one respondent (R13). He finally sold his e-bike, because he did not want to go alone.

This indicator clearly influences the wish or ability of respondents to participate in activities. Most respondents perceive their *living situation* as a barrier on their accessibility, or perceive it as a reason to participate in more activities. However, there is one respondent (R7) who implies she is not less accessible even though she attends fewer activities due to her *living situation.*

Relation family

The *relation with family* can influence the respondents in three ways: (1) as an activity, (2) as help and (3) as a though of reason. The first reason is related to the social needs of the respondents, who value family often as most important activity during their week (See paragraph 4.1). Respondents who have difficulty traveling independently (R1, R2, R3) often only have activities with their family members to look forward to. R2 explains she only goes out to dinner when her children visit her. To these respondents, this indicator strongly influences their accessibility.

Secondly, family members are a valuable source of help for most respondents. Nine out of fourteen respondents get picked-up by their children, their spouses or other family members once in a while. Depending on the availability of family members, these respondents can participate in more or less activities. Sometimes the family members just function as a taxi-service for the respondents to bring them to an activity although most often they travel to an activity they are attending together. While some (R10) do not wish to put too much pressure on their children, others are happy to be helped, not just with them functioning as a taxi-service. Especially the less mobile respondents (R1, R2 and R3) receive more help in the form of grocery shopping being done for them, but also the more independent respondents receive help from their children concerning modern technology or advise on applying for permits and such (R10). When respondents get help from their children, this both influences their perceived accessibility as well as the mode of transport they can use.

At last, family members help the respondents be reasonable during situations they find dangerous. The children of two respondents (R2 and R6) have ordered their parents to stop driving, or at least to specific places. The daughter of one respondent (R9) has convinced her mother to give up her stove after lighting a fire in her house. She now gets food delivered for the whole week by a special service. She explains the consequences for her: “You have to do less grocery shopping, so you stay at home more often. Things as such are all solutions, but some solutions create new problems.” (R9)[23]. She understands the choices of her daughter well, but she finds is a shame she has less reasons to go outside. The influence of their children limits some respondents in their car use, suggesting this influences the mode of transport they use. Both R2 and R6 have suggested that they no longer drive to specific places, but they do not appear to feel less accessible because alternative modes of transport have been presented to them.

[22] Original translation: “Ik had wel gedacht ‘we kunnen wel eens daar heen fietsen, en dan daarheen. Maar dat gebeurde dus niet.” (R13)

[23] Original translation: “Er worden ook niet zoveel boodschappen meer gedaan en dan blijf je vaker in huis. Het zijn allemaal oplossingen maar het één houdt het ander weer tegen.” (R9)

4.5. Synthesis

Relating back to the basics of accessibility, Geurs and van Wee (2004) have stated that 'good' planning for accessibility should always contain the four components of accessibility: Land-use, Transport, Individual and Temporal. Table 6, 7 and 8 (below) illustrate all indicators and their associated components and their influences. Both tables visualise the results of this research, as well as those of Handy and Clifton (2001). The X's in black represent the overlap of both studies, results confirming each other, while the red X's indicate results of Handy and Clifton (2001) that have not been revealed in this research. These results are contradictory. Finally, the blue X's represent new results that came forward from this study and were not found by Handy and Clifton (2001).

Taking a closer look at the Activity Factors in table 6, it shows that its indicators have taken all four components of accessibility into account. The most common components in Activity Factors are the land-use and the individual. This signifies that seniors value the indicators based on how the destination / activity is situated (land-use) and indicators based on their own preferences (individual), over the temporal and transportation components to choose an activity. This is a result of the theory of Handy and Clifton (2001) being focused on the perception of people, in which individual opinions should be taken into account. In contrast to the results of this research, five indicators are negligible: *price of products, customer recognition, facilities, atmosphere* and *landscape design.* This eliminates the importance of the only indicator (*facilities*) in Activity Factors that came forward from one of the most important barriers based on the research of Risser et al. (2010). This lowers the importance of the individual and land-use components in this research slightly. This could suggest that land-use and individual components are valued less by seniors than the respondents used in the study of Handy and Clifton (2001). However, this neglect may also be related to the current indicators being considered 'satisfactory' among the respondents, and therefore may not be considered as a possible influence on their accessibility.

Three new indicators have been added to the Activity Factors that strengthen both the individual and land-use component. Nor Handy and Clifton (2001) nor Risser et al. (2010) have taken notice of these three indicators, which have come forward as important to seniors of Apeldoorn concerning their accessibility: *Familiarity, Facilities* and *Combining activities*. The first two are related to the individual component, while the last indicator is related to the land use, transport and temporal component. Both the Transportation and Temporal component seem underrepresented. However, previous paragraphs have shown that seniors are willing to travel a longer distance and take a different mode of transport to get to specific activities, suggesting Transportation components do have an influence on the activities chosen. The Temporal component likewise seems rather unimportant, but an indicator such as *hours of operation* is very influential on seniors participating in an activity or not. While the Temporal component is only present in two indicators, its influence is proportionally important compared to other components.

Based on the table 6 and the elaboration of both sub-factors in paragraph 4.2. it can be stated that the Activity related sub-factor is more important to seniors in Apeldoorn than the sub-factor 'Related to Design'. Nine indicators are considered important in 'Related to Activity' as opposed to four in 'Related to Design'. Furthermore, the context given to these indicators (see paragraph 4.2.) suggests seniors perceive this first sub-factor as a more important pull-factor to participate in activities. This is contrary to the theory of Handy and Clifton (2001), which states that both-sub factors are equally important.

Activity Factors (Handy & Clifton, 2001)	Grounded	Accessibility Component(s) (Geurs & Van Wee, 2004)
Activity Related		
Size and scale	X	Land use
Quality of products	X	Individual
Price of products	X	Individual
Hours of operation	X	Temporal
Crowds / lines	X	Individual, Temporal
Interior design	X	Land use
Atmosphere	X	Individual
Ownership	X	Individual
Customer recognition	X	Individual
Familiarity	X	Individual
Different products	X	Individual
Facilities	X	Land-use
Related to design		
Mix of activities	X	Land use
Density of activities	X	Land use
Parking facilities	X	Land use, Transport
(outer) Atmosphere	X	Individual
Landscape design	X	Land-use
Combining activities	X	Land use, Transport, Temporal

Table 6: Adjusted Activity Factors by Handy and Clifton, 2001 with their influence and respective accessibility components by Geurs and van Wee, 2004. The black colour illustrates overlap, the red illustrates not confirmed indicators and the blue illustrates new indicators. Source: own design, 2019.

Table 7 visualises the Transportation Factors and their influence per mode of transport as well as the accessibility components they represent. In the framework of Handy and Clifton (2001), the presence of transport, land-use and individual components seem evenly represented. On the other hand, their research seems to give little attention to the temporal component. Several indicators have not been considered important, based on the results of paragraph 4.3. Compared to the study of Handy and Clifton (2001), especially indicators with land-use components are regarded as unimportant by the seniors of Apeldoorn. This is based on the respondents of this study not paying much attention to their surroundings: almost all indicators related to the physical surroundings have not been mentioned (often). Again, the disinterest of the respondents in these specific indicators may be related to them being sufficiently maintained and therefore have not come up as influences to the respondent's accessibility.

Table 7 furthermore visualises which indicators are important per mode of transport being used by the respondents. The first striking observation is that Handy and Clifton (2001) have found many links between indicators and specific modes of transport, whereas this research shows relatively few indicators that overlap with theirs. It suggests that seniors consider fewer indicators when thinking about their accessibility. Respondents only considered 7 out of the 21 indicators to be important for cycling. This is connected to the ability of seniors to execute certain actions. As has been explained in paragraph 4.4.1., only few barriers are enough for seniors to stop cycling completely. This avoidance could explain why additional indicators are not perceived, while the respondents of Handy and Clifton (2001) do perceive these indicators. Secondly, the respondents of this research have only mentioned half of the indicators that are considered important for walking by Handy and Clifton (2001). This is striking, as paragraph 4.1.1. has scrutinised the importance of walking to the seniors of this research: there is no real alternative for it, so people cannot switch to another mode of transport if barriers arise. It is therefore interesting that only few indicators have been mentioned. It is quite possible that

indicators such as *pavement condition* and *cleanliness* are not considered simply because they are well maintained and no barriers are perceived because of this. Handy and Clifton (2001) argue that especially Level-of-Service and Comfort are important for walking, but the respondents of this research view most of the Level-of-Service indicators as nuisance, or irrelevant for their accessibility.

Only five of the eight important indicators of Risser et al. (2010) have been mentioned by the respondents. This strengthens the idea that *conflict with other modes, Terminal design, volume/crowding*, *vehicle design* and *service frequency* are important to seniors. However, the respondents do not seem to value these indicators as important as those of the study of Risser et al. (2010). Especially their most important barrier 'inconsiderate car drivers' has not been mentioned as an actual barrier during this study. The respondents have mentioned that they seek to avoid uncomfortable situations and therefore may no longer come across these barriers. As a consequence, these indicators might not come up as important.

Transportation Factors (Handy & Clifton, 2001)	Auto	Transit	Walking	Cycling	Accessibility Component(s) (Geurs & van Wee, 2004)
Impedance					
Distance	X	X	X	X	Transport
In-vehicle time	X	X			Transport
Out-of-vehicle time	X	X	X	X	Transport
Costs	X	X			Transport, Individual
Topography			X	X	Transport, Individual
Level-of-Service					
Volume/crowding	X	X	X	X	Individual
Signalisation	X	X	X	X	Land-use
Service Frequency		X			Temporal
Hours of operation		X			Temporal
Directness of route	X	X	X	X	Transport
Continuity of route	X	X	X	X	Transport
Information availability		X			Land-use
Signage	X	X	X	X	Land-use
Facility widths	X		X	X	Land-use, Individual
Vehicle design	X	X	X	X	Transport
Shelter		X	X	X	Land-use
Benches		X	X		Land-use
Terminal					
Parking availability	X	X		X	Land use
Parking Costs	X	X			Transport, Individual
Terminal locations	X	X	X		Individual, Land use
Intermodal connections		X	X	X	Transport
Terminal Design	X	X	X	X	Land use, Individual
Comfort Factors					
Traffic speed	X	X	X	X	Transport, Individual
Traffic volume	X	X	X	X	Transport, Individual
Infrastructure design					Land-use
Pavement condition	X	X	X	X	Land-use
Lighting	X	X	X		Temporal
Weather	X	X	X	X	Temporal
Shade		X	X	X	Individual Land-use
Scenery	X	X	X	X	Individual, Land-use
Crime/police presence		X	X	X	Individual
Cleanliness		X	X	X	Land-use, Individual
Conflict with other modes	X	X	X	X	Individual, Transport
Other users	X	X	X	X	Individual
Total overlap	13/23	16/28	13/26	7/21	

Table 7: Adjusted Transportation Factors by Handy and Clifton, 2001, with their influence and respective accessibility components by Geurs & van Wee, 2004. The black colour illustrates overlap, the red illustrates not confirmed indicators and the blue illustrates new indicators. Source: own design, 2019

Finally, table 8 illustrates the indicators of Personal Factors. As this study has focused on the perceptions of a specific population group (seniors), the relation between these indicators and individual components of accessibility is recognisable. Each of the indicators has shown to be decisive for respondents considering the modes of transport they wish or are able to use.

These indicators are based on the findings of Risser et al. (2010) and have been categorised in table 4 in the theoretical framework. Unlike the other indicators in their research, all the indicators of the Personal Factors are mentioned and also have been considered as imperative by the respondents. As Handy and Clifton (2001) have not considered these indicators as important in their research while doing a broad inventory on important indicators, it could mean that the Personal Factors are solely influential on the senior population considering their accessibility. It is however possible that these indicators have been overlooked by the respondents.

Personal Factor (Handy & Clifton, 2001)	Auto	Transit	Walk	Cycling	Component(s)
Health					
Execution of actions			X	X	Individual
Observation skills	X				Individual
Decision making		X			Individual
Social Network					
Living situation	X			X	Individual
Relation Family	X		X		Individual

Table 8: Personal Factors, with their influence and respective accessibility components by Geurs & van Wee, 2004. The blue colour illustrates new indicators. Source: own design, 2019

Chapter 5: Conclusion

The main research question of this thesis is as follows: How do seniors in the city of Apeldoorn experience their accessibility and which factors influence this perception of accessibility? Based on the theoretical framework that has been set up in the second chapter and the analyses that have been done in the previous chapter, this main question will be answered in the following paragraph, followed by a discussion, reflecting on this research and a recommendation for future research on this subject.

5.1. Sub conclusions

In their research, Handy and Clifton (2001) do not distinguish a degree of importance between their overarching factors nor their sub-factors and indicators. The previous chapter has elaborated on all indicators and the value given to them by the respondents. This showed that some indicators are valued more than others. Based on the previous chapter, one cannot assume that the higher the frequency, the more influential the indicator is. Some indicators have been mentioned over 30 times, but only influence the respondents' choice slightly because the indicator is perceived as a luxury or a nuisance. On the other hand, some indicators have been mentioned only six times, but every time the indicator made the difference between going, avoiding or being unable to participate in an activity. Based on the indicators, this paragraph will answer the sub-questions set to support the main question of this research.

Which facilities and destinations are important to seniors?

The seniors in this study have marked two destinations as most important to them: the supermarket as their most important need and family as their most important emotional destination. For both neighbourhoods, the shopping centre of Ordenplein is a popular destination because of the availability of other shops next to the supermarket. Other supermarkets are alternated depending on what type of products people wish to buy and their familiarity with the supermarkets. Considering their emotional important destinations, family provides company as well as support. When a senior is unable to travel to their family, their family members often take turns in visiting them. Furthermore, visiting the city centre, visiting the hairdresser and the church are considered as important destinations.

It has been striking that the majority of seniors value several destinations not for the actual activity itself, but for the social interactions that arise during visiting these destinations. Thus, while activities such as the supermarket, family and the hairdresser have a different goal, they have in common that they fulfil the social needs of seniors. This is particularly meaningful for seniors who lost their partner and live alone.

Currently, the framework of Handy and Clifton (2001) does not incorporate this 'second' goal that seniors give to visiting a destination to fulfil their social needs. Depending on where they are able to do so, they will tend to visit these places more often.

What role do Activity Factors play in the perceived accessibility of Seniors?

This overarching factor contains two sub-factors in which the indicators of 'Related to Activity' have a much higher frequency of being mentioned than the indicators of 'Related to Design'. Together these two sub-factors could be considered the enablers to participate in activities, which either motivates or stops seniors to participate in a specific activity.

The high frequency of *atmosphere, familiarity* and *quality of products* indicates that respondents perceive these three indicators of 'Related to Activity' as crucial influencers on their accessibility. These

three indicators are overall perceived as positive since they contribute to the motivation of seniors to participate in a specific activity rather than not. Only one indicator (*hours of operation*) has withheld seniors from participating in a specific activity, being perceived as a barrier. Within this sub-factor, two new indicators have been suggested to be complementary to the current indicators: *familiarity* and *different products / services*.

The indicators of 'Related to Design' have a lower frequency of being mentioned in total. Yet, two of its indicators seem to have a crucial influence on the experiences of the respondents: *mix of activities at site* and *density of activities at site* have been imperative for respondents to avoid specific locations such as the city centre. Furthermore, they are the underlying reason why the Ordenplein is such a success among the respondents of both neighbourhoods. For this sub-factor, an additional indicator has been suggested: *combining activities on route*.

Considering both sub-factors, there are several indicators that have not been mentioned by seniors, suggesting seniors perceive these indicators as unimportant. Seniors seem to care less about the *price of products / services, customer recognition, facilities, atmosphere* and *landscape design*. The first three indicators are related to 'services' of an activity, which seems to be less important to seniors. The last two indicators refer to the physical environment that is not considered important by seniors.

What role do Transportation Factors play in the perceived accessibility of seniors?

This factor contains the most indicators, which might imply that this factor influences the accessibility perceived by seniors the most. The four sub-factors contain an order of importance to the seniors, which is more striking than between the sub-factors of Activity Factors. First of all, 'Level-of-Service' indicators have the highest frequency of being mentioned during the interviews, suggesting several of these indicators play an important role in the perceived accessibility of seniors. The seniors of Apeldoorn however perceive these indicators not as a direct influence on their accessibility, but rather as an influence on which mode of transport they want or do not want to take to their chosen destination. The results illustrate how seniors will not be stopped from getting to an activity, but how they will avoid specific modes of transport based on these indicators. Especially the *directness of route, continuity of route, hours of operation, service frequency and vehicle design* influence the mode of transport seniors wish to use. The indicators considering the physical environment (*benches, shelters* and *facility widths*) and those related to providing information (*signalisation, signage, information availability*) could be considered as negligible influences on the perceived accessibility of seniors. Its little influence is countered with solutions by seniors or their family members.

The second sub-factor 'Impedance' contains a single indicator (*distance*) that could be considered imperative for seniors considering their accessibility. This is directly influenced by the sub-factor of Health as it determines the seniors' ability to cross a specific distance. Equal to the conclusions of Handy and Clifton (2001), *distance* and *in-vehicle time* are not the only indicators that influence the mode of transport a person wishes to use. The indicators of both Impedance and Level-of-Service together determine this wish and the willingness of using a specific mode of transport. It is again interesting to observe that the indicator of *costs* does not influence the perceived accessibility of seniors, just as the *costs of products/ services* (Related to Activity) does not seem to influence them.

The last two sub-factors seem to have less influence on the daily choices seniors make to participate in activities. The sub-factor of Terminal has been mentioned the least of all, simply because the seniors of Apeldoorn do not use the public transport system much. Their overall trust in how the system works, and their actual experiences with the public transport are neutral/negative and with several alternative modes of transport such as family member lifts and taxi-services as the Valys, they use the system

rarely. As the usage of the public transport system is low among the seniors of Orden en Berg en Bos, it might explain the low frequency of this sub-factor and therefore its small impact on the perceived accessibility.

The last sub-factor is 'Comfort'; it contains as many indicators as Level-of-Service, but only three of them seem to influence the seniors' sense of accessibility. These three indicators *weather, traffic speed* and *traffic volume* are all influenced by Personal Factors, forming barriers that withholds seniors from traveling to specific destinations. It is interesting that these barriers have also been overcome by Personal Factors. Just as with the sub-factor Level-of-Service, the indicators based on the physical environment (*shade, scenery, lighting* and *cleanliness*) only few indications were given that these indicators play a role in the perceived accessibility of seniors.

What role do Personal Factors play in the perceived accessibility of seniors?

This factor has been introduced in this study to overcome the knowledge deficit that had been indicated by Risser et al. (2010) when comparing their research to the framework of Handy and Clifton (2001). Two sub-factors were introduced: Health and Social Network.

The influence of the first sub-factor has been especially important for seniors to determine which mode of transport is used. However, unlike the two sub-factors Level-of-Service and Impedance, that influence the mode of transport a person wishes to use, this sub-factor influences their actual ability to do so. The three indicators *execution of health, decision making* and *observation skills* determine respectively a seniors' ability to walk and cycle, to use the public transport system and to drive a car. Depending on which mode of transport a senior is still able to use, different indicators of Transportation- and Activity Factors are affected. Because there are alternatives for cycling, driving and the public transport, seniors switch as soon as barriers are faced, whereas with walking, there are no real alternatives, and barriers must be faced. However, results indicate that walking is not influenced by more indicators than other modes of transport.

The Social Network factors are more focused on the actual accessibility seniors perceive than the Health Factors. Both *living situation* and *relation family* not only determine if seniors can participate in activities at all, but also when. Seniors are dependent on their direct partner, but also their absence influences the willingness or ability of a person to participate in an activity. This *relation with family* can be considered similar, because seniors perceive their family members as one of the most important activities they have and regularly depend on them to bring them to activities.

The impact of these five indicators appears to be considerable on how seniors get around and how they perceive their accessibility. Therefore, it could be suggested that this sub-factor is indeed an addition to the existing framework of Handy and Clifton (2001).

5.2. Conclusion

The research question of this thesis is as follows: How do seniors in the city of Apeldoorn experience their accessibility and which factors influence this perception of accessibility? By answering the proposed sub questions, this study has been able to acquire the findings necessary to find a solution to the research question. This study has looked into the perceived accessibility of seniors living in the city of Apeldoorn. First of all, the results of this study show that the seniors in Apeldoorn have an overall positive perception on their accessibility. While Handy and Clifton (2001) have presented two factors that influence the perception of people on their accessibility, this research found that this is not completely accurate in the eyes of seniors living in Apeldoorn. In addition to the two conventional factors 'Activity Factors' and 'Transportation Factors' this study has suggested a third influential factor: 'Personal Factors'. This 'new' factor contributes to the individual influences of a person on their own perceived accessibility. All the indicators that exercise an influence in some way are covered by the three overarching factors. Although these three factors are on the same level, various differences in the influence of its indicators can be recognized. The Activity factors are almost always the reason why the seniors do an activity and leave their house in the first place. The Activity factors can be seen as the pull factors, and rather stimulate than block seniors to go to a certain activity. They furthermore demonstrate why specific activities are more enjoyed than others (consider for example atmosphere). Its indicators are most important in the choice of 'which' activity to go to, while on the other hand, Transportation- and Personal Factors contain the vast majority of indicators influencing the ability to get there, but also which mode of transport is being used. The Transportation factors rather block than stimulate the seniors to go out. The results show us that (some) seniors still want to participate in their activities, in spite of not being able to go by bike or by foot anymore. The seniors find a different method of transportation in order to go to their activity, of which taxi-services are very popular. Based on these results it can be concluded that when seniors want to go somewhere but are not capable, they will try to find alternative transport. This fact shows us that Activity factors have more influence on the willingness of seniors in participating in an activity than the transportation factors.

There are several indicators suggested by Handy and Clifton (2001) that did not appear as an influence to seniors in Apeldoorn. Fifteen indicators have not been mentioned by the respondents as potential influences on their accessibility. Their absence from the results can imply two things: Either these indicators are currently perceived as adequate and the seniors 'forget' that they influence their accessibility because they have been taken for granted Or, the seniors of Apeldoorn indeed do not consider these indicators as important, in contrast to the framework that has been set by Handy and Clifton (2001). This indicates that seniors value different indicators considering their own accessibility. Moreover, the seniors of this study have mentioned specific indicators considerably more than other indicators, which implies there is a difference in importance given to them: not all indicators are equally influential on the perceived accessibility of seniors.

Several sub-factors of both Transportation- and Personal Factors discuss how people can get to a certain activity instead of determining the perceived accessibility. Some indicators have more influence on using specific modes of transport than others, creating a difference between being able to use a mode of transport (Health Factors) and wanting to use a specific mode of transport due to preferences (Level-of-service- and Impedance Factors). Once a senior has become familiar with an alternative mode of transport instead of their old mode, they seem to accept their situation as a given and continue to do what they used to do, without feeling less accessible than before. The only exception made by seniors is walking. Once this becomes more difficult due to their decreased ability to execute actions, their feeling of accessibility decreases as well. However, seniors who have been in the situation of not

being able to walk distances for a longer time, do not appear negative either. Again, acceptation of their world becoming smaller seems to influence their view on their own accessibility.

The findings of this study also display that most indicators are not independently influencing the perceived accessibility of a senior. The indicators are interconnected, influencing one another and together they construct the perceived accessibility of an activity. The conceptual model currently implies that the three overarching factors individually influence the perceived accessibility. Based on the results of this research, the conceptual model created in the theoretical framework might be extended. This interconnection between the indicators, the exchange between the three overarching factors of Activity, Transportation and Personal should be visualised by setting arrows going both ways between all three factors. A new conceptual model is proposed:

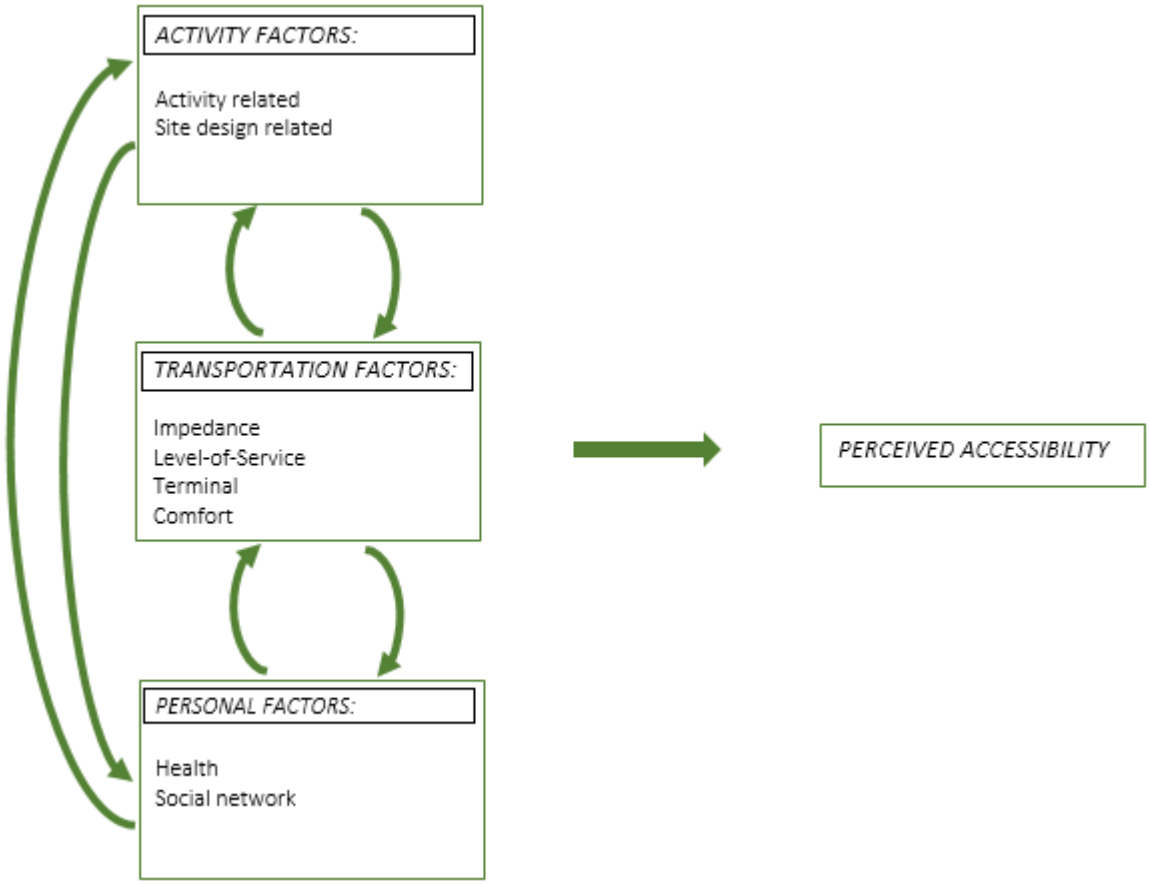


Figure 3: New conceptual model of perceived accessibility of seniors

Figure 3 illustrates the assumption that perceived accessibility is influenced by three types of factors: Activity, Transportation and Personal factors. Based on the literature, most of their indicators influence the perceived accessibility of seniors. Through an explorative study, this research suggests that the three factors are interconnected and together they construct the perceived accessibility of a senior.

Chapter 6: Recommendations and reflection

Now that the main research question has been answered, this chapter will reflect on the given conclusions and the research that has been done as a whole. First of all, research is never ending and while this study has answered a contemporary question, new questions arise from it. Paragraph 6.1. provides recommendations for future research as well as some recommendations for the municipality of Apeldoorn to keep in mind while planning for accessibility in their city. In retrospect, Paragraph 6.2 analyses the limitations of this research and provides insight into how these can be improved or even avoided.

6.1. Recommendations

This explorative study on the perceived accessibility of seniors has only grasped the surface of possible influences. The respondents of this study perceive their accessibility predominantly positive, which indicates that the city of Apeldoorn is doing a proper job in becoming a socially included city in which seniors feel like they are part of society. Based on this research, several recommendations can be made for future research and the municipality of Apeldoorn.

6.1.1. Recommendations for future research

First of all, the conclusion of this research suggests that specific indicators of the three overarching factors are more important than others. Some seniors no longer use a specific mode of transport because of a specific indicator while other indicators are considered as a luxury of small nuisance and will only influence their mood rather than their perceived accessibility. This research has explored a vast number of these indicators and has brought forth new indicators, including the Personal Factors. However, its explorative character and its specific method of data collection (qualitative research) has set limits to which extent these indicators could be considered more or less important than others. It has been limited by the relatively few respondents, as well as the lack of a framework to 'grade' the importance of these indicators. A recommendation for future research therefore is to gain a better understanding of how important these indicators actually are in the perceived accessibility of seniors. Quantitative research is more qualified for this type of research and can demonstrate their significance, possible through a survey set out among seniors of this population group. This will strengthen the generalizability of the study, as the research population is much bigger and secondly, a survey could for example use a scale from 1-10 to 'grade' the influence of each indicator. As a bonus, this method will take into account indicators that have now been 'forgotten'. Based on the results, several indicators have not been mentioned by the respondents either because they are indeed not important, or they are being 'forgotten' because these indicators are satisfied to a certain degree that they no longer trouble a senior's mind and as such pose no barrier.

Secondly, this research indicates that Personal Factors play a role in the perceived accessibility of seniors. The two sub-factors seem crucial to this population group because their health deteriorates over time and their social network shrinks as more friends and family members die. Both Risser et al. (2010) and Haustein (2012) express the link between age and senior's ability to participate in activities. This suggests that Personal Factors have a different influence among different population groups. Future research therefore should look into how these Personal Factors influence the perceived accessibility in different population groups. This could lead to new insights in this still new Personal Factor, but also give an indication on whether these Personal Factors are indeed age-bound to different population groups, or whether they are solely important to the current researched group of seniors.

A third research recommendation relates to usage of public transport by seniors. This research has concluded that the seniors of Apeldoorn do not wish to use the public transport system and avoid it if possible. Based on a report of the European Commission (2018), the Dutch public transport system scores below average on train services (73,9) and local public transport (76.0), while for example the German system is considered as one of the best for both train services (85.3) and local public transport (83.3). This could explain why the results of this research are at odds with that of Haustein (2012), who concluded that a large population of seniors do use the public transport and are even dependent on it. Future research should take a look into the indicators perceived by seniors that could possibly create this difference, by taking a closer look at both of the systems. Comparing these systems through the eyes of seniors would show how one of the most vulnerable and growing population groups perceives the public transport system. This could give indications on how to overcome the negative stigma that currently surrounds the Dutch public transport system.

6.1.2. Recommendations for the Municipality of Apeldoorn

First of all, seniors in both the neighbourhoods of Berg en Bos and Orden experience their accessibility predominantly positive. Seniors seem to accept their fate when their accessibility shrinks and accept that their world becomes smaller. As a result, their perception on accessibility in this research is understood as positive. Based on this research, the municipality could therefore argue that the seniors in this city are doing fine and no extra precautions or interventions have to be taken to increase their accessibility. However, there are several footnotes to the conclusion of this research that should be taken into account by the municipality.

First of all, the municipality should be wary of cognitive dissonance that could occur among seniors. As seniors 'accept' their world becoming smaller, they might perceive this as a very negative process. This might result into these people persuading themselves they did not want to go to specific places anyway (Festinger, 1962). The results of this research being positive, may in fact not be truly positive. Several seniors have explained they no longer wish to use the public transport system because they have grown unfamiliar with it. As a result, they refuse to use the bus or train. While they do not truly see it as a 'loss' in their accessibility, alternative modes of transport may not always be found, resulting in them accepting the reality that they can no longer visit specific places. While their perceived accessibility does not decline, their actual willingness to participate in activities does decline, which is eventually causing seniors to lose their connection to society, even if they do not mind. The municipality should therefore continue its attempts to get seniors to participate in activities outside of their house or regular meeting place, or 'their world' will shrink to a select few places that are still within their acceptable accessibility.

A second recommendation is related to the trend of bringing activities 'home' and cutting out the necessity to travel to daily activities such as the supermarket of the hairdresser. In both theory and practice, this trend could be considered very positive. First of all, in theory the accessibility of a person grows as the activity is more easily reached. Bringing an activity at home, at any given time at request of a person would grant this person ultimate accessibility. Secondly, for seniors that face declining mobility and have difficulty getting to specific activities, this trend could be regarded as a relief: you do not have to move a house with better accessibility, no longer have to get exhausted by doing these things yourself etc. This trend takes down several barriers that the respondents of this research are facing. At the same time, this trend is shutting these people off from society, as they leave their house less and less: the opposite effect of what accessibility is supposed to provide. While this is not a direct conclusion of this research, the municipality of Apeldoorn should contemplate the consequences of this trend as they work on becoming a more inclusive city for all ages.

6.2. Critical Reflection

In this paragraph, the researcher will look back on the choices that have been made throughout this research. While the researcher has tried to clarify the choices that have been made, some choices could have been made differently to benefit the results of this research. Here, some of these limitations will be elaborated and an indication is given as of how the researcher could have avoided these challenges.

First of all, some theoretical insights are related to the research of Risser et al. (2010). Their research has found several barriers seniors perceive in their accessibility, which in this research have been translated into indicators. Except for the indicators of Personal Factors, three indicators have not been mentioned and five have only been mentioned a few times without much value given to them by respondents of this research. The first insight is based on the geographical background of the study of Risser et al. (2010). It took place in several countries within Europe such as Germany, France, Italy and Switzerland. These countries have different cultures and infrastructure systems that are considered extremely different in quality (European Commission, 2018). The study of Risser et al. (2010) did take respondents from eight different countries and presented them together, as if seniors perceive the same barriers in every country in Europe. Based on this assumption, the barriers and their indicators have been integrated into this study. It is therefore interesting to see that only half of these barriers were perceived by seniors living in Apeldoorn, while respondents of eight different countries do agree with each other.

In the conclusion of this study, another possible explanation has been given as to why these indicators may not have been considered by the respondents. The results have shown that seniors may 'forget' these indicators as they are considered sufficient, they may be avoided on purpose or they just do not influence a senior at all. Due to the explorative nature of this research, it has been possible to determine why influential indicators are important, but it has not been possible to determine the reasoning of seniors to not consider specific indicators. It is therefore quite possible that the barriers perceived by the respondents of Risser et al. (2010) have been important to the respondents of this research, but the municipality of Apeldoorn has already tackled these barriers in the past, or that seniors simply avoid these barriers. This uncertainty can be considered a downside to this research: it is unable to confirm whether or not the 'unimportant' indicators for the seniors in Apeldoorn, are also 'unimportant' to seniors elsewhere.

This downside to the research leads to the following question concerning its methodology: "were the choices made in this research, the best to perform it?" The first recommendation given in the previous paragraph indicates a continuation of this study, focusing more on the 'value' people give to each indicator through quantitative research. In answering 'how' seniors perceive their accessibility more precisely, such a research would have added great value to this current study. However, based on the theoretical framework that has been built in this research, it became clear that there was a knowledge gap on which indicators play a role in the perceived accessibility of seniors. While Handy and Clifton (2001) have created a framework with several indicators, the research of Risser et al. (2010) has shown that indicators important to seniors are missing in this framework. Therefore, a qualitative research was chosen to explore these missing indicators and to understand which indicators are specifically important to senior, based on the current framework of Handy and Clifton (2001). It would have been useful to follow up this qualitative research with quantitative research using for example a survey (see recommendation for further explanations on how). However, as the current research was troubled in finding enough respondents for the qualitative research part, it was not realistic to pursue an even greater population group that had to be willing to participate in this potential survey. This study has

shown that additional indicators exist, however this result could have been strengthened by the findings of a quantitative study. The main goal, to gain an understanding of which indicators are important to seniors in Apeldoorn and how they perceive their accessibility, has been reached using the current methods used.

During the data collection, a particular method did not go as planned during the interviews: the use and creation of the mental maps. Prior to the execution of this study, the researcher had planned on using these mental maps as a more important source of information for the data collection and the finals results. Yet, during the interviews it became clear that this was more difficult than expected. Respondents had difficulty with mapping their destinations conform to the idea of 'accessibility' and switched back to geographical distances as a reference point halfway the interview. While the researcher has tried to steer them clear of this idea, most respondents appeared to keep this in mind while drawing. For this research, the maps were therefore not very useful to investigate the accessibility of specific destinations. Secondly, the mental maps drawn by the respondents differed from each other to such a degree, that the researcher found it difficult to compare them. In hindsight, the respondents should have been steered in a different direction while drawing their mental maps, for these maps to become useful source of information. Based on the research of Gould & White (2012), comparing mental maps could have been done easier if the respondents would have been asked to draw their whole neighbourhood rather than specific locations they travel to. This would create more comparable images as every respondent draws the same, but in their own interpretations. An image of both neighbourhoods would be created and how all its accessible destinations in it are perceived by respondents. This however would limit the research to the boundaries of each neighbourhood, excluding destinations outside of them. As a result, the maps could be related to the interviews to gain a better insight of which indicators create higher barriers as a visual relation can be made to what is said, and the less accessibility is perceived.

A third reflection on the methodology is focused on the respondents that have been interviewed. This research was mostly dependent on pro-active respondents, who had contacted the researcher instead of the researcher reaching out to them. Eight interviews occurred in this manner, resulting in eight enthusiastic seniors to represent more than half of the research population. The other six respondents were found by the researcher, but two participated to complain about a bus stop in the neighbourhood and a third seemed especially interested in the social interaction derived from the interview. Out all respondents, four respondents argued that they were not sure if they could contribute to this research, because they perceive their accessibility as good. They thought only seniors with accessibility issues were allowed to participate. Respondents may have had different motives to participate but they all shared their experiences enthusiastically. They have formed a diverse research population for this research. However, the researcher is doubtful that these fourteen respondents represent all 935 seniors of both neighbourhoods. These seniors may perceive their accessibility more negative or even more positive than the current respondents of this study. Truthfully, it is difficult to determine whether a different population group would have generated the same results or not, based on the different motivations of seniors to participate. The researcher has no knowledge on the reasoning of seniors to not respond to the inquiries of the researcher. Searching for an even more specific research population can give future research some insights in differences between these populations. However, further specifying the research population will lower the number of potential amount of respondents and these people will be more difficult to identify due to the General Data Protection Regulation (AVG in Dutch). This regulation prohibits institutions from sharing personal information without the consent of the owner (Autoriteit Persoonsgegevens, 2019).

Finally, this study has a low generalisability considering how seniors perceive their accessibility. Taking into account the small research population (14 respondents out two neighbourhoods with over +900 seniors), other choices could have been made to raise the generalisability of this study. Only two cases were selected and only one perspective (the seniors' point of view) has been taken into account in both cases. The researcher could have chosen to expand the research cases further, which would have strongly improved the generalisability of the study, as more data is collected. If the researcher had chosen to collect more different perspectives from people who know the respondent such as their caregivers or their children, possibly more detailed information would have been available to analyse. This could have been especially important for information that the specific senior forgets to share or deliberately omits from the researcher. However, the research of Risser et al. (2010) has concluded that experts and seniors have a different point of view on accessibility. As this research has solely focused on the experiences of seniors themselves, the researcher expects that the current population group will generate the most reliable information, as they are the ones experiencing the accessibility themselves.

References

Allecijfers.nl. (2019a) Informatie buurt Berg en Bos: Bekijk informatie over meer dan 100 onderwerpen voor de buurt Berg en Bos in de gemeente Apeldoorn. Retrieved from https://allecijfers.nl/buurt/berg-en-bos-apeldoorn/

Allecijfers.nl. (2019b). Informatie buurt Orden: bekijk informatie over meer dan 100 onderwerpen voor de buurt Orden in de gemeente Apeldoorn. Retrieved from https://allecijfers.nl/buurt/orden-apeldoorn/

Alsnih, R., & Hensher, D. A. (2003). The mobility and accessibility expectations of seniors in an aging population. *Transportation Research Part A: Policy and Practice*, *37*(10), 903-916.

Autoriteit Persoonsgegevens. (2019). *Introductie AVG.* Retreived from https://autoriteitpersoonsgegevens.nl/nl/onderwerpen/algemene-informatie-avg/algemene-informatie-avg#wat-merken-mensen-van-wie-persoonsgegevens-worden-verwerkt-van-de-avg-6211

Baarda, B., Bakker, E., Julsing, M., & Fischer, T. (2014). *Basisboek kwalitatief onderzoek*. Groningen: Noordhoff.

Bryman, A. (2016). *Social research methods*. Oxford university press.

Bryman, A. & Bell, E. (2007). *Business research methods*. US: Oxford University Press.

Burns, L. (1979). Transportation, Temporal, and Spatial components of accessibility. Toronto: Lexington Books.

Buzan, T., & Buzan, B. (2002). *How to mind map*. London: Thorsons.

Centraal Bureau voor de Statistiek. (2004). Een van de vijf ouderen beperkt in bewegingsvrijheid. Retrieved from https://www.cbs.nl/nl-nl/nieuws/2004/04/een-van-de-vijf-ouderen-beperkt-in-bewegingsvrijheid

Centraal Bureau voor de Statistiek. (2014). *Projecties van de gezonde levensverwachting tot 2030.* Retrieved from https://www.cbs.nl/nl-nl/achtergrond/2014/26/projecties-van-de-gezonde-levensverwachting-tot-2030

Centraal Bureau voor de Statistiek. (2019a, March 29) *Nabijheid voorzieningen: afstand locatie, wijl- en buurtcijfers 2018.* [Dataset] Retrieved from https://opendata.cbs.nl/statline/#/CBS/nl/dataset/84463NED/table?dl=1A084

Centraal Bureau voor de Statistiek. (2019b, Juli 26). *Kerncijders wijken en buurten 2018* [DataSet] Retrieved from https://opendata.cbs.nl/statline/#/CBS/nl/dataset/84286NED/table

Condeço-Melhorado, A., Reggiani, A. & Gutiérrez, J. (2014). *Accessibility and Spatial interaction.* Cheltenham, UK: Edward Elgar Publishing Limited

Coughlin, J. (2001). Transportation and older persons: Perceptions and preferences: A report on focus groups.

Crotty, M. (1998). The Foundations of Social Research: Meaning and perspective in the research process. London, Great Britain: Sage

CROW. (2011). Seniorenproof wegontwerp: Ontwerpsiggesties voor een veiliger infrastructuur binnen de bebouwde kom. Publicatie 309. Ede, Netherlands: CROW.

Curl, A., Nelson, J. D., & Anable, J. (2011). Does accessibility planning address what matters? A review of current practice and practitioner perspectives. *Research in Transportation Business & Management*, *2*, 3-11.

De Monitor. (2017). Feiten en cijfers over ouderen die langer thuis wonen. Retrieved from https://demonitor.kro-ncrv.nl/artikelen/feiten-en-cijfers-over-ouderen-die-langer-thuis-wonen

Doorewaard, H., & Verschuren, P. (2007). Het ontwerpen van een onderzoek. Den Haag: Boom

Dudau, A. (2015, February 18). Outer layer research philosophy [weblecture]. Retrieved from https://www.youtube.com/watch?v=wXFVNlDPdB4

Ekamper, P & van Nimwegen, N. (2018). Demografie in het kort: vergrijzing. *Demos: bulletin over bevolking en samenleving 34*(6), 4-7.

El-Geneidy, A.M., Levinson, D.M. (2006). Access to Destinations: Development of Accessibility Measures. Minneapolis: University of Minnesota, Department of Civil Engineering.

European Commission. (2018). *Transport in the European Union: Current trends and issues.* Retrieved from https://ec.europa.eu/transport/sites/transport/files/2018-transport-in-the-eu-current-trends-and-issues.pdf

Festinger, L. (1962). *A theory of cognitive dissonance* (Vol. 2). Stanford university press.

Gemeente Apeldoorn. (2018). *Programma Apeldoorn Comfortabele Gezinsstad 2018-2022*. Retrieved from:https://www.kennisbanksportenbewegen.nl/?file=8627&m=1519728058&action=file.download

Geurs, K. T., & Van Wee, B. (2004). Accessibility evaluation of land-use and transport strategies: review and research directions. *Journal of Transport geography*, *12*(2), 127-140.

Gould, P., & White, R. (2012). *Mental maps*. Routledge.

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. *Handbook of qualitative research*, *2*(163-194), 105.

Gustafsson, J. (2017). Single case studies vs. multiple case studies: A comparative study.

Handy, S. L. (2002). Accessibility-vs. mobility-enhancing strategies for addressing automobile dependence in the US.

Handy, S. (2005). Planning for accessibility: In theory and in practice. In *Access to destinations* (pp. 131-147). Emerald Group Publishing Limited.

Handy, S. L., & Clifton, K. J. (2001). Evaluating neighborhood accessibility: Possibilities and practicalities. *Journal of transportation and statistics*, *4*(2/3), 67-78.

Hansen, W. G. (1959). How accessibility shapes land use. *Journal of the American Institute of planners*, *25*(2), 73-76.

Haustein, S. (2012). Mobility behavior of the elderly: an attitude-based segmentation approach for a heterogeneous target group. *Transportation*, *39*(6), 1079-1103.

Heirbaut, T. & Visser. G.J. (2017). *Bereikbaarheid en verkeersveiligheid in Apeldoorn 2017* [conceptrapportage].

Iacono, M., Krizek, K. J., & El-Geneidy, A. (2010). Measuring non-motorized accessibility: issues, alternatives, and execution. *Journal of Transport Geography*, *18*(1), 133-140.

Jenkins, G. D., Nader, D. A., Lawler, E. E., and Cammann, C. (1975). Standardized Observations: An Approach to Measuring the Nature of Jobs. *Journal of Applied Psychology,* 60: 171– 81

Kvale, S., & Brinkmann, S. (2009). Interviews: Learning the craft of qualitative research interviewing. Sage.

Lättman, K., Olsson, L. E., & Friman, M. (2016). Development and test of the Perceived Accessibility Scale (PAC) in public transport. *Journal of Transport Geography*, *54*, 257-263.

Lotfi, S., & Koohsari, M. J. (2009). Analysing accessibility dimension of urban quality of life: Where urban designers face duality between subjective and objective reading of place. *Social Indicators Research*, *94*(3), 417-435.

Majdandzic, D. & Van Oosterom, G. (2014). *Dik Apeldoorns stadskookboek.* Netherlands, Wageningen: Uitgeverij Blauwdruk.

Martens, K. (2012). Justice in transport as justice in accessibility: applying Walzer's 'Spheres of Justice'to the transport sector. *Transportation*, *39*(6), 1035-1053.

Ministerie van Volksgezondheid, Welzijn en Sport. (2018). *Programma Langer Thuis.* Retrieved from https://www.rijksoverheid.nl/onderwerpen/zorg-en-ondersteuning-thuis/documenten/rapporten/2018/06/15/programma-langer-thuis

Mollenkopf, H., Marcellini, F., Ruoppila, I., Széman, Z., Tacken, M., & Wahl, H. W. (2004). Social and behavioural science perspectives on out-of-home mobility in later life: findings from the European project MOBILATE. *European Journal of Ageing*, *1*(1), 45-53.

Nationale Zorggids. (2019). Oost-Groningen niet voorbereid op toename vergrijzing in 2040. Retrieved from https://www.nationalezorggids.nl/ouderenzorg/nieuws/47411-oost-groningen-niet-voorbereid-op-toename-vergrijzing-in-2040.html

Planbureau voor de Leefomgeving. (2016). *Richting Geven – Richting Maken: Balans van de leefomgeving 2016.* Retrieved from https://themasites.pbl.nl/balansvandeleefomgeving/wp-content/uploads/pbl-2016-balans-van-de-leefomgeving-2016-1838.pdf

Pirie, G. H. (1979). Measuring accessibility: a review and proposal. *Environment and planning A*, *11*(3), 299-312.

Robson, C. (2002). *Real world Research.* Oxford, England: Blackwell.

Risser, R., Haindl, G., & Ståhl, A. (2010). Barriers to senior citizens' outdoor mobility in Europe. *European Journal of Ageing*, *7*(2), 69-80.

Saunders, M., Lewis, P. & Thornhill, A. (2009). *Research methods for business students.* Harlow, England: Pearson.

Saunders, M., Lewis, P. & Thornhill, A. (2015). *Research methods for business Students.* Harlow, England: Pearson.

Scotland, J. (2012). Exploring the Philosophical Underpinnings of Research: Relating Ontology and Epistemology to the Methodology and Methods of the Scientific, Interpretive, and Critical Research Paradigms. *English language teaching*, *5*(9), 9-16.

Solberg Søilen, K., & Huber, S. (2006). 20 svenska fallstudier för små och medelstora företag: pedagogik och vetenskaplig metod. Studentlitteratur.

Swanborn, P. G. (2008). *Case-study's. Wat, wanneer en hoe?* Den Haag: Boom Onderwijs

Thanh, N. C., & Thanh, T. T. (2015). The interconnection between interpretivist paradigm and qualitative methods in education. *American Journal of Educational Science*, *1*(2), 24-27.

Stoeldraijer, L., Van duin, C. & Huisman, C. (2017). Bevolkingsprognose 2017-2060: 18,4 miljoen inwoners in 2060. Retrieved from https://www.cbs.nl/-/media/_pdf/2017/51/bevolkingsprognose-2017-2060-18-4-miljoen-inwoners-in-2060.pdf

Van Duin, L. & Stoeldraijer, L. (2014). Projecties van de gezonde levensverwachting tot 2030. Retrieved from https://www.cbs.nl/nl-nl/achtergrond/2014/26/projecties-van-de-gezonde-levensverwachting-tot-2030

Van Wee, B., Hagoort, M., & Annema, J. A. (2001). Accessibility measures with competition. *Journal of Transport geography*, *9*(3), 199-208.

Wegener, M., & Fürst, F. (2004). Land-use transport interaction: state of the art. *Available at SSRN 1434678*.

Whelan, M., Langford, J., Oxley, J., Koppel, S., & Charlton, J. (2006). The elderly and mobility: A review of the literature.

Appendices

Appendix 1: Operationalisation of Activity Factors

Appendix 2: Operationalisation of Transportation Factors

Appendix 3: Operationalisation of Personal Factors

Appendix 4: Heat map of seniors living in Apeldoorn

Appendix 5: List of respondents

Appendix 6: Interview guide

Appendix 7: Mental Maps

Appendix 8: Code Scheme

Appendix 9: Dutch Abstract

Appendix 1: Operationalisation of Activity factors

Activity factors	Operationalisation
Related to activity	
Size and Scale	The number of people that (can) participate in the activity at the same time
Quality of products/services	The quality of a product, by 'special brand' or 'store brand' or 'basic brand' The quality of a service, through communication with individual
Price of products/services	The price in euros for a specific product or service
Hours of operation	The timeframe an individual can participate in an activity
Crowds/lines	The presence of crowds or lines at a location or activity
Interior design	The way the interior of a location or activity has been designed
Atmosphere	The pervading mood of a location or activity
Ownership	The ownership of the activity by a chain business or a local business
Customer recognition	To which extend customers are given attention and are communicated with by the employees of a location or activity
Facilities	To which extend the activity provides basic facilities next to the activities
Related to design	
Mix of activities at site	To which number activities at the site complement to each other or are more of the same
Density of activities at site	The possibility of combining one activity with other at the same location
Parking facilities	Quality of the facilities and the parking distance to the site
Atmosphere	The pervading mood exterior to a location or activity (surroundings)
Landscape design	The way the exterior of a location has been designed

Appendix 2: Operationalisation of Transportation factors

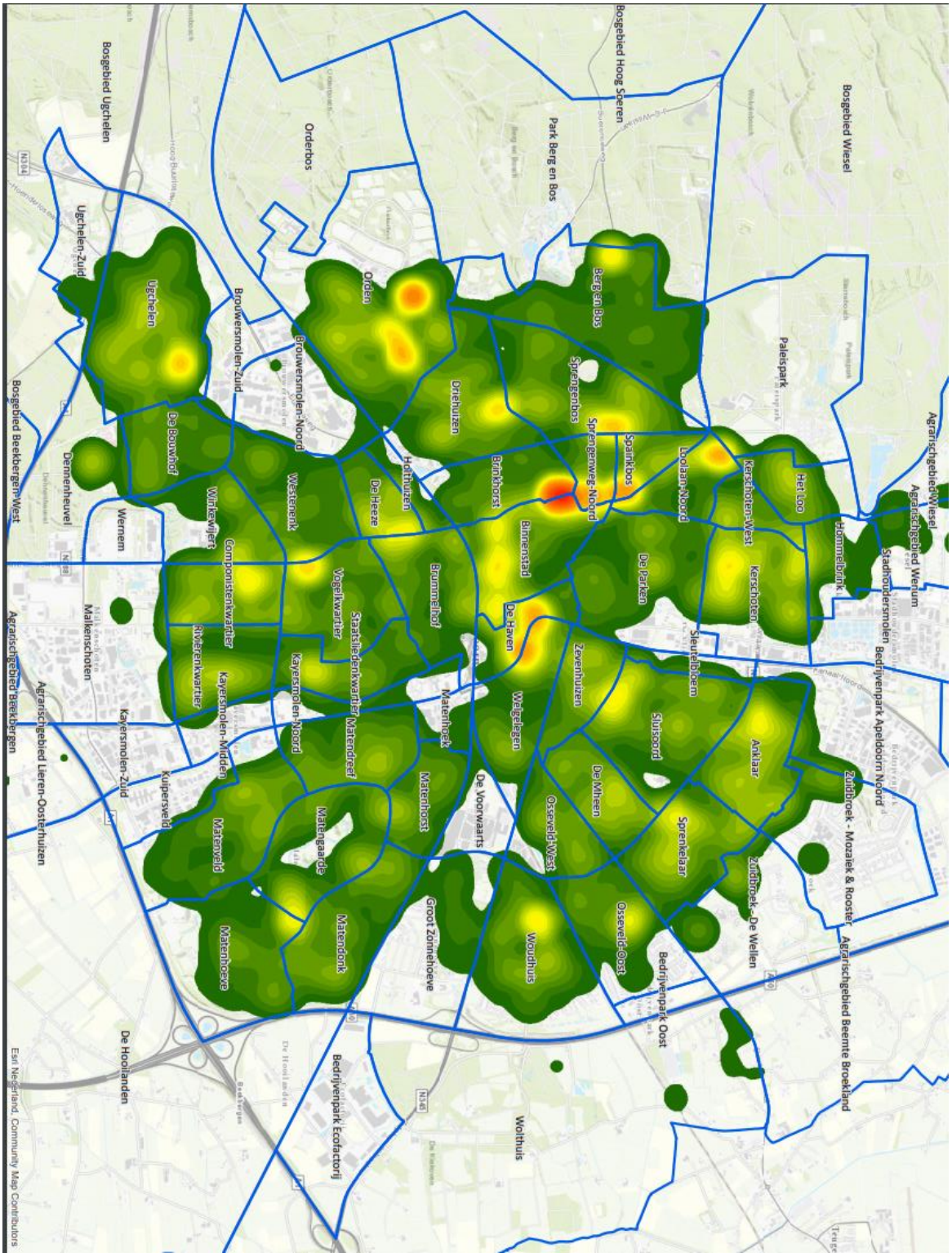
TRANSPORTATION FACTORS	OPERATIONALISATION
Impedance factors	
Distance	To what extend the distance to reach a location influences the individual to travel and by which means
In-vehicle time	To what extend the time spend in the vehicle influences the journey of an individual
Out-of-vehicle time	To what extend the time spend outside of a vehicle influences the journey of an individual, and how this time is caused
Costs	To what extend costs influence the journey of an individual, and their choice of transport
Topography	To what extend the topography of the surrounding area influences the individual and their choice of modal
Level-of-service factors	
Volume/ crowding	To what extend the bustle during the journey influences the individual and their choice of modal
Signalisation	To which extend the available signals along the journey direct the individual into the right direction
Service frequency	To which extend the frequency of transit modes influence the individual and their choice of transport
Hours of operation	To which extend opening hours of transit modes influence the individual and their choice of transport
Directness of route	To which extend the directness of the route taken by a mode of transport, influences the individual and their choice of transport
Continuity of route	To which extend the user is influenced by the ability to reach their destination without interruption
Information availability	To which extend the (un)availability on transit modes influences the individual and their choice of transport
Signage	To which extend signs are available and how this influences the individual
Facility widths	To which extend the widths of facilities influence the journey of an individual
Vehicle design	To which extend users are comfortable using a mode of transport and to which extend this influences their choice of transport
Shelter	To which extend users can shelter from weather conditions and how this influences their journey and choice of transport

Benches	To which extend resting places are available and how this influences the users journey and choice of transport
Terminal factors	
Parking availability	To which extend the user can park its vehicle in the proximity of the destination and how this influences the user and the choice of transport
Parking Costs	To which extend parking costs influence the users journey and their choice of transport
Terminal Locations	To which extend the proximity of a terminal influences the users and their choice of transport
Intermodal connections	To which extend the intermodal connections influence the user in making its journey and their choice in transport
Terminal Design	To which extend the design of the terminal the user is influenced in their journey and choice of transport
Comfort factors	
Traffic speed	To which extend traffic speed in different modes of transport influences the users journey and choice of transport
Traffic volume	To which extend traffic volume in different modes of transport influences the users journey and choice of transport
Infrastructure design	To which extend the design of infrastructure on the route influences the users journey and choice of route
Pavement condition	To which extend the condition of the pavement influences the journey of the individual
Lighting	To which extend lighting along the route to destination influences the user
Weather	To which extend the weather influences the user.
Shade	To which extend the user can seek shelter from the sun during travel time.
Scenery	To which extend the environment along the route influences the user.
Crime/policy presence	To which extend the user perceived social security through the presence of crime and police
Cleanliness	To which extend the user is influences by the (un)cleanness of the road.
Conflict with other Modes	To which extend other modes of transport influence the user during the journey
Other users	To which extend other users of the transport system influence and affect the user

Appendix 3: Operationalisation of Personal Factors

Personal Factors	Operationalisation
Health	
Observation skills	Ability of a person to observe their direct surroundings though eyesight and hearing
Decision making	Ability of a person to process information and give a response to it
Execution of actions	Ability of a person to execute a certain action physically
Social Network	
Living situation	To which extend the composition of the household and living situation influences a person
Relation family	To which extend the relation with family members influences a person

Appendix 4: Heat map of seniors living in Apeldoorn



Figuur 1: Heat map of seniors of 75+ living at home in Apeldoorn. Source: Municipality of Apeldoorn (2019).

Appendix 5: List of respondents

Ref.	Name	Age	Location	Neighbourhood	Date	Duration
R1	Dinnie	75	Community centre Mandala	Orden	May 29, 2019	46:42
R2	Jacqueline	80	Community centre Mandala	Orden	May 29, 2019	46:42
R3	Jannie	81	Community centre Mandala	Orden	May 29, 2019	15:37
R4	Corrie	77	Community centre Orca	Orden	June 6, 2019	22:56
R5	Mr. Kok	93	At home	Orden	June 6, 2019	35:26
R6	Mrs. Kampen	85	At home	Berg en Bos	June 6, 2019	40:07
R7	Mrs. Linthout	83	At home	Berg en Bos	June 11, 2019	45:03
R8	Mr. Slijkhuis	78	At home	Orden	June 11, 2019	64:14
R9	Mrs. Van Koten	85	Community centre Orca	Orden	June 13, 2019	62:23
R10	Mrs. Baan	84	At home	Orden	June 17, 2019	38:42
R11	Mrs. Schouten	84	At home	Berg en Bos	June 18, 2019	34:45
R12	Mrs. Hazenberg	81	At home	Berg en Bos	July 2, 2019	39:37
R13	Mr. Hazenberg	80	At home	Berg en Bos	July 2, 2019	59:41
R14	Mr. Beek	93	At home	Berg en Bos	July 9, 2019	44:04

Appendix 6: Interview guide

Eva Rispens, mei 2019

Gesprek opnemen

Goedkeurig vragen om geluidsopnames te maken van dit gesprek. De data zal anoniem zijn, wel wordt de respondent gevraagd of zijn of haar leeftijd genoemd mag worden in het onderzoek. Na het analyseren van deze data zal de onderzoeker deze gegevens op verzoek wissen van haar persoonlijke apparatuur. De gegevens zullen echter wel voor 5 jaar bewaard blijven in het archief van de universiteit.

Introductie

- Wie ik ben
- Korte uitleg van het onderzoek gericht op perceptie van ouderen
- Waarom de gemeente Apeldoorn dit zo interessant vindt
- Uitleg definitie 'bereikbaarheid' dmv. Voorbeeld oma in een rolstoel:
    - Oma kan haar buren niet meer bereiken doordat drempels in de weg liggen waar ze met haar nieuwe rolstoel niet meer heen kan. De buren voelen sindsdien onbereikbaar. Het restaurant 4km verderop waar ze iedere donderdag naartoe gaat met het taxibusje naartoe gaat, vindt ze prachtig geregeld, want ze wordt opgehaald, voor de deur afgezet en weer thuis gebracht. De plek die veel verder weg is, voelt voor haar veel bereikbaarder.

Deel 1: Mental Map

Dit interview bestaat uit twee delen. Het eerste deel betreft het maken van een soort kaartje van de omgeving. Het is een kaart die laat zien, hoe U uw omgeving ziet. De kaart hoeft dan ook niet op een 'echte' kaart van de stad te lijken, maar mag gewoon mag gewoon met woorden of kleine tekeningen worden weergegeven. Iedereen ziet zijn of haar omgeving anders, en daarom zal uw kaart er heel anders uitzien dan die van iemand anders. Geen enkele kaart is dan ook fout, omdat de kaart uw ervaring moet uitstralen.

In het midden van deze kaart bevindt zich uw 'thuis'. Vanaf uw huis gaat u naar allerlei plekken toe: boodschappen, familie en vrienden, de kapper, dokter, hobby's, noem het maar op.

Kunt u voor mij het volgende doen:

- Tekenen / opschrijven welke plekken u het afgelopen tijd regelmatig naartoe bent gegaan.
- Tekenen / opschrijven welke plekken u het afgelopen tijd niet meer vaak hebt bezocht, maar nog wel zou willen bezoeken
- Hoe dichterbij u een locatie of activiteit tekent, hoe makkelijker u de plek kunt bereiken. Indien u een plek lastiger vindt om te bereiken, tekent u het verder van het midden af.
    - Dit gaat niet om 'echte' afstand!
    - Hoe dikker de lijn, hoe lastiger deze plek voor u te bereiken is. Hoe dunner de lijn, hoe gemakkelijker u deze activiteit kunt bereiken.

(voor onderzoeker)

- Houdt in de gaten welke locaties als eerst opkomen bij de respondent: deze locaties worden mogelijk belangrijker geacht dan suggesties die moeten worden aangedragen.
- Lijst mogelijke suggesties voor interessante locaties (indien respondent vast lijkt te lopen)
    - Boodschappen
    - Op de koffie
    - Hobby's
    - Uit eten
    - Rondje wandelen
    - Zorg

Deel 2: Het begrijpen van de mental map

Nu u klaar bent met al deze locaties en lijnen intekenen, gaan we het hier in detail over hebben.

Activity Factors (Over de locaties)

- Welke locaties zijn voor u het meest belangrijk?
- Hoe frequent komt u hier?
- Wat maakt deze locaties of activiteiten zo aantrekkelijk?
- Waarom 'deze' en niet 'die andere'? (vergelijk met opties in de omgeving)
- Waarom gaat u niet meer naar bepaalde locaties?

- Doorvragen om volgende dingen duidelijk te krijgen:
    - Grootte
    - Kwaliteit
    - Openingstijden
    - Prijs
    - Atmosfeer
    - Design
    - Ownership
    - Houding werknemers
    - Drukte
    - Density of activities

Transportation Factors (over komen op locaties)

Beginnend bij de dunste lijnen, opwerkend naar de dikste:

- Hoe komt u op deze locatie?
- Waarom heeft u deze lijn zo dun / dik getekent? Wat maakt de locatie zo moeilijk of gemakkelijk te bereiken?
- Kunt u hier ook op andere manieren komen? (andere vervoersmiddelen)
- Zijn er barrières die u tegenkomt onderweg?
- Welke dingen maken uw reis meer aangenaam?

(voor onderzoeker)

- Zit er een patroon in de antwoorden?
    - Allemaal dichtbij / ver weg? Waarom?
- Doorvragen om volgende dingen duidelijk te krijgen:
    - Impedance factors: afstand, tijd in auto, kosten, topografie
    - Level-of-service factors: drukte, signalering, openingstijden, directheid, informatie, breedte faciliteiten, beschutting, rustplaatsen
    - Terminal factors: parkeermogelijkheden, kosten parkeren, locaties terminals, aansluitingen en design
    - Comfort factors: snelheid en volume verkeer, kwaliteit stoep, verlichting, weer, schaduw, omgeving, schoonheid, gevoel van veiligheid, conflict met ander verkeer en andere gebruikers.

Personal factors (individuele invloeden)

(indien nog niet duidelijk naar voren gekomen door eerder gestelde vragen)

- Bent u afhankelijk van anderen om op bepaalde locaties te komen?
    - Hoe beïnvloed dat uw mogelijkheden daar te komen?
- Heeft uw gezondheid invloed op waar u nu wel en niet naartoe gaat?
- Doorvragen om volgende dingen duidelijk te krijgen:
    - Gezondheid
    - Sociale netwerk

Overig

- Vergelijking maken tussen locaties en vragen waarom dit zo is
- Controle vragen stellen omtrent de tekening versus wat gezegd wordt over dezelfde locatie, of dit overeen komt of niet.

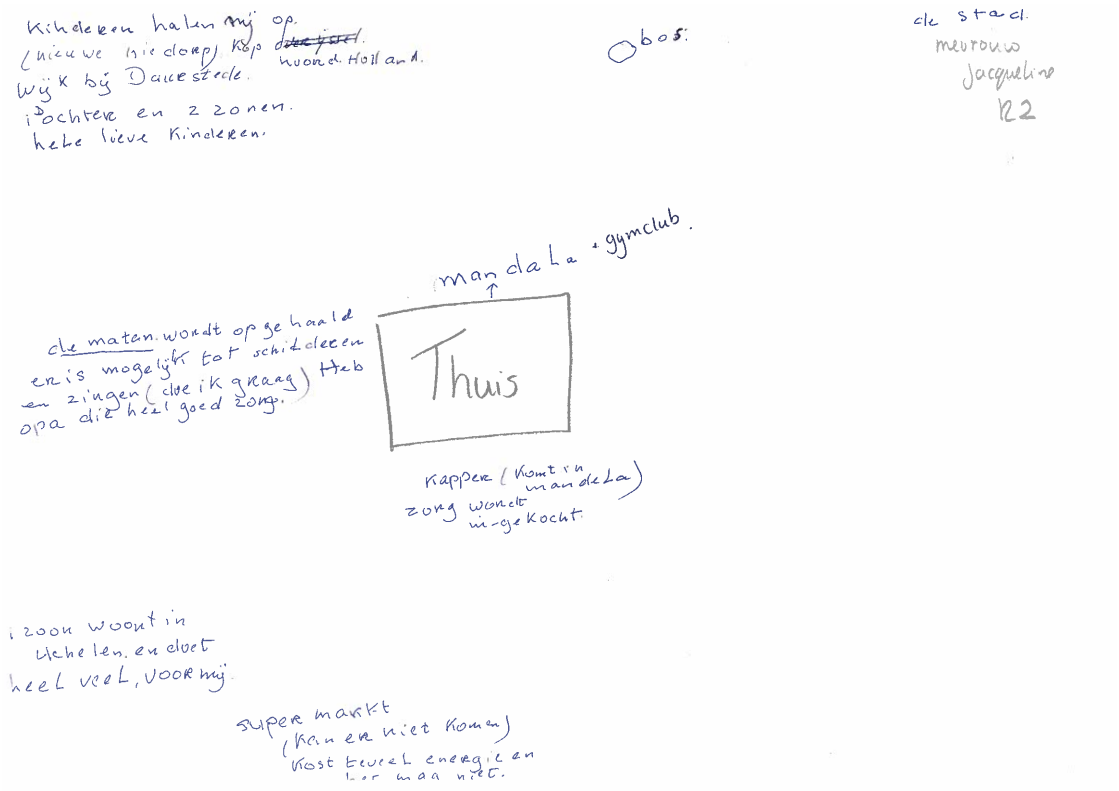
Afsluiting

Hartelijk bedankt voor u tijd!

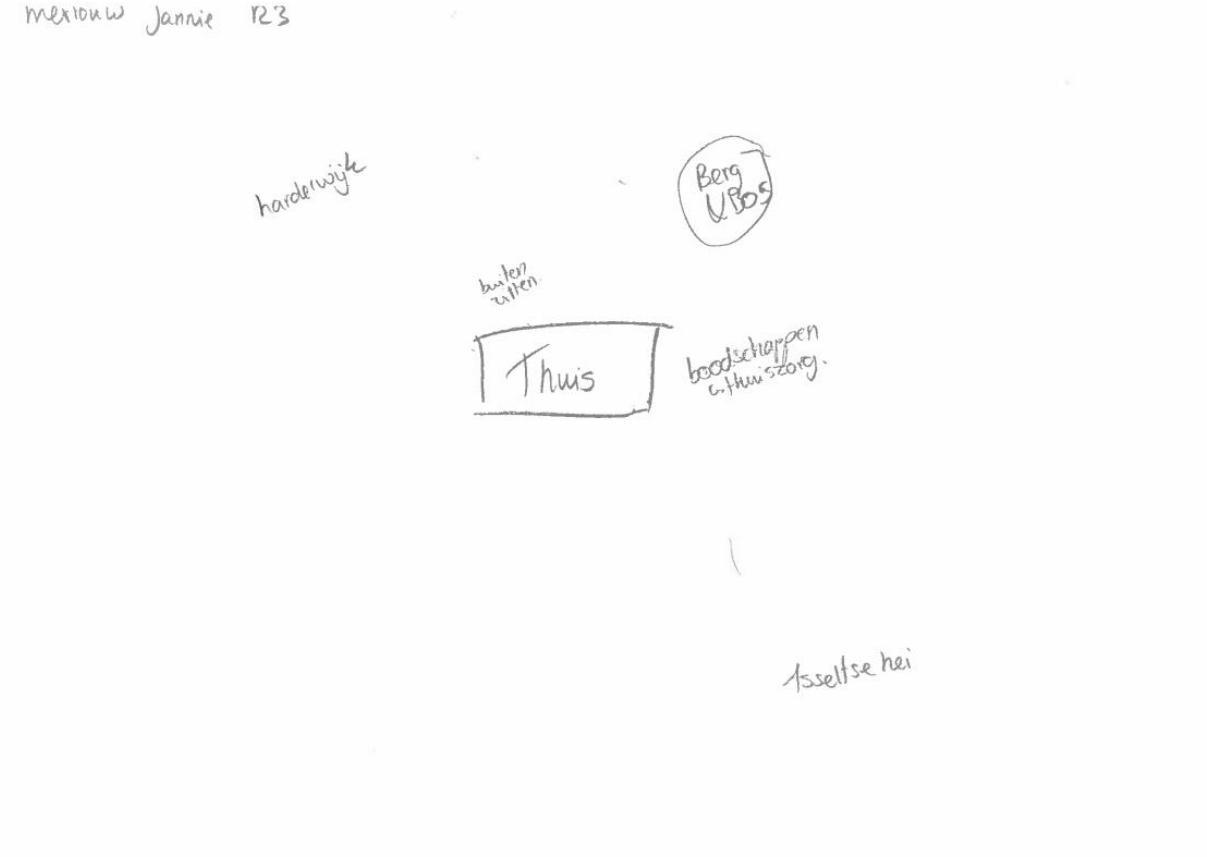
Appendix 7: Mental maps



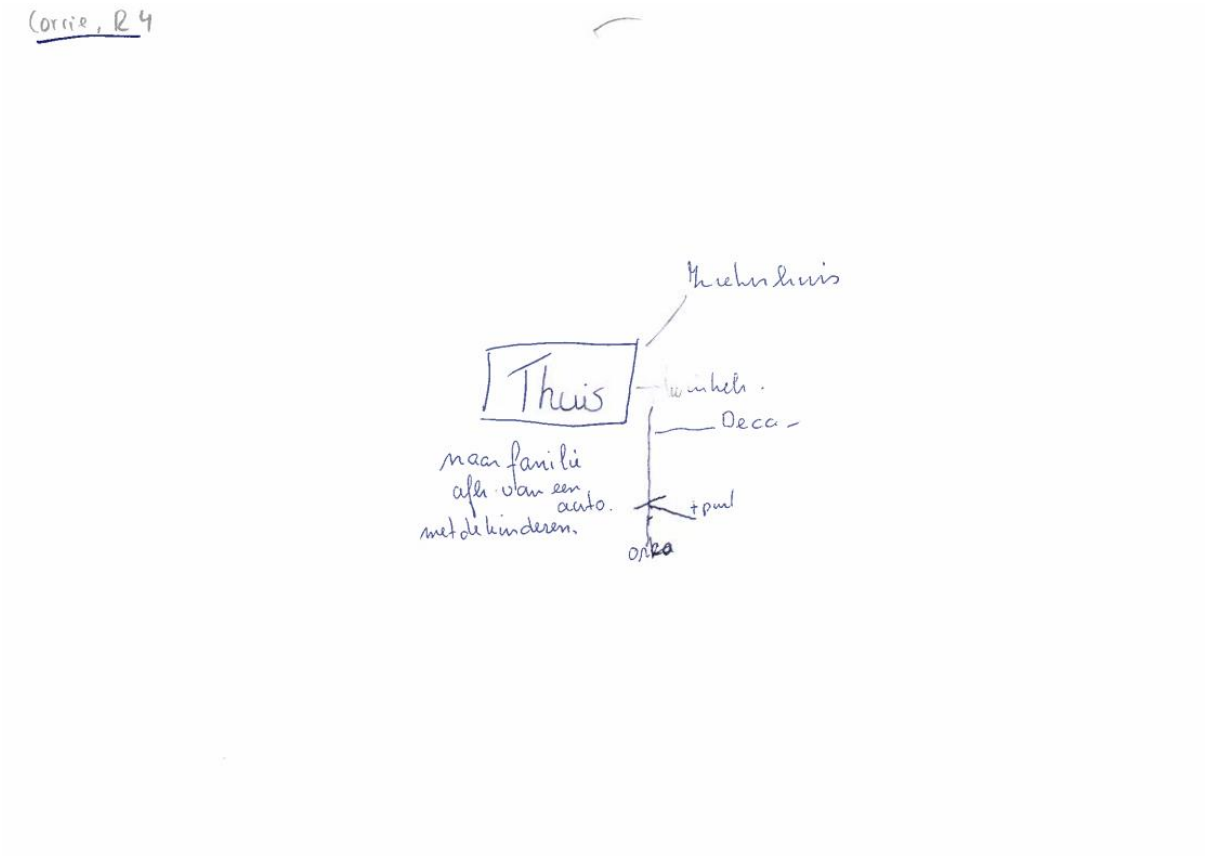
Mental Map 1 by R1



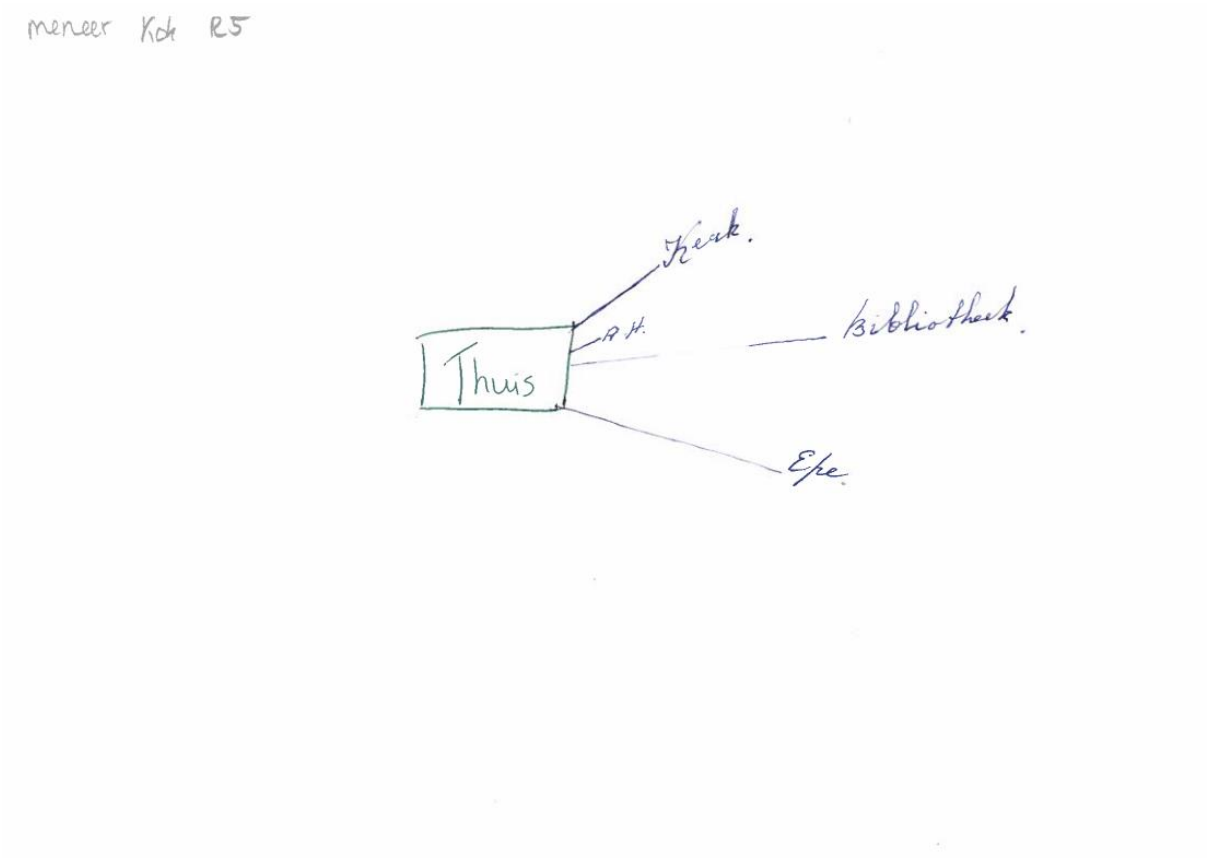
Mental Map 2 by R2



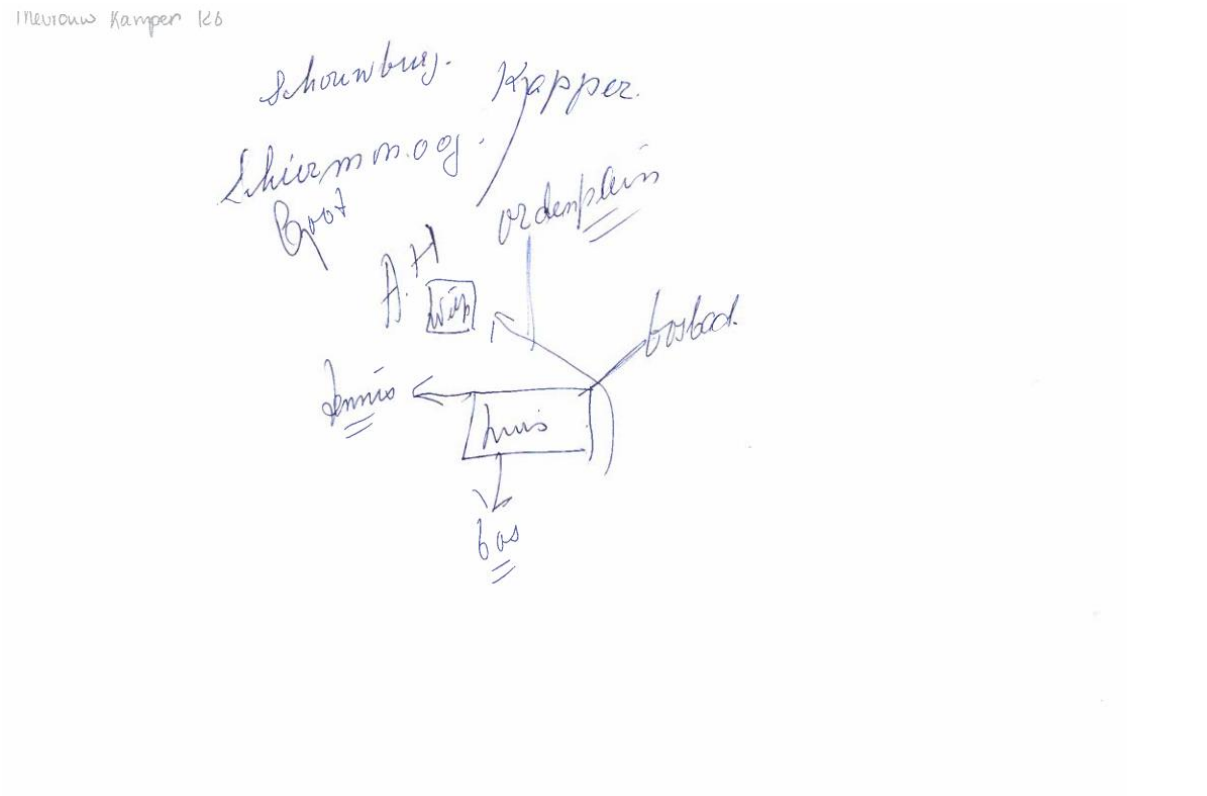
Mental Map 3 by R3



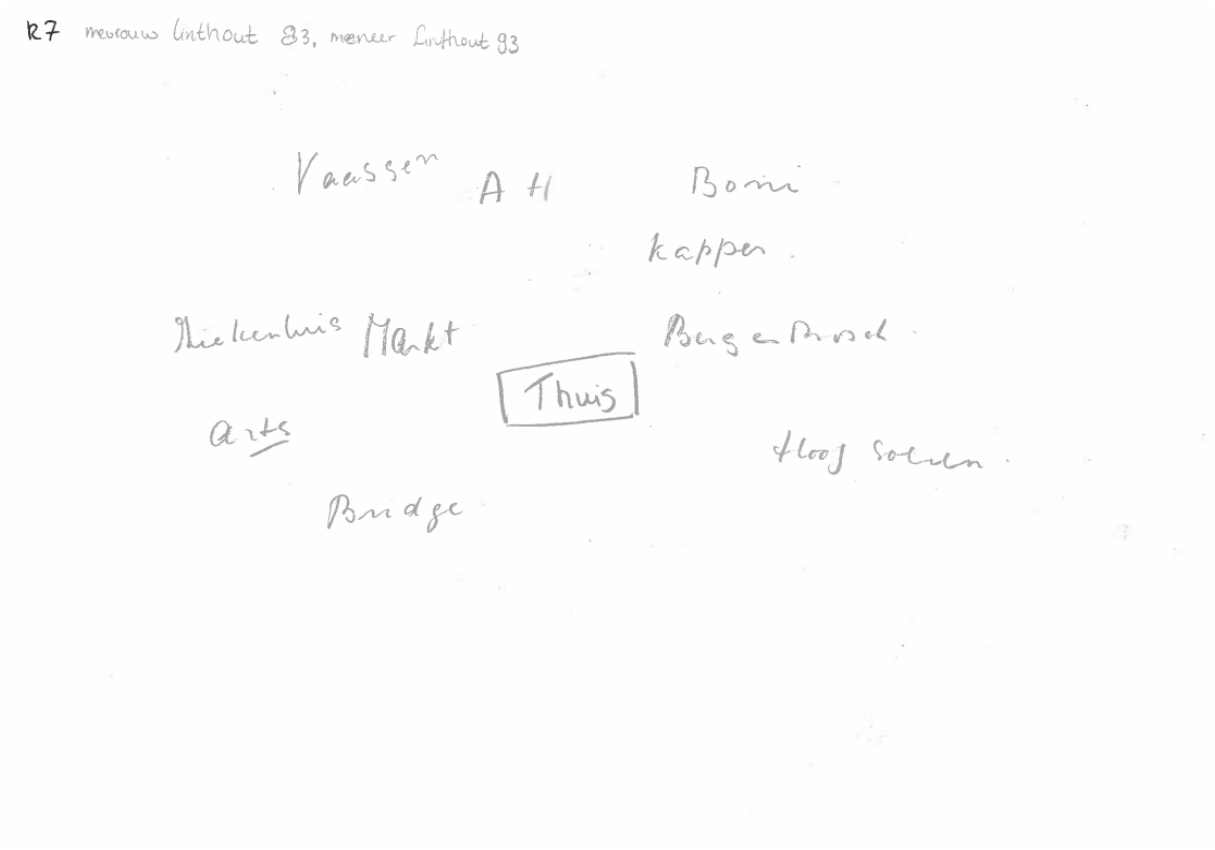
Mental Map 4 by R4



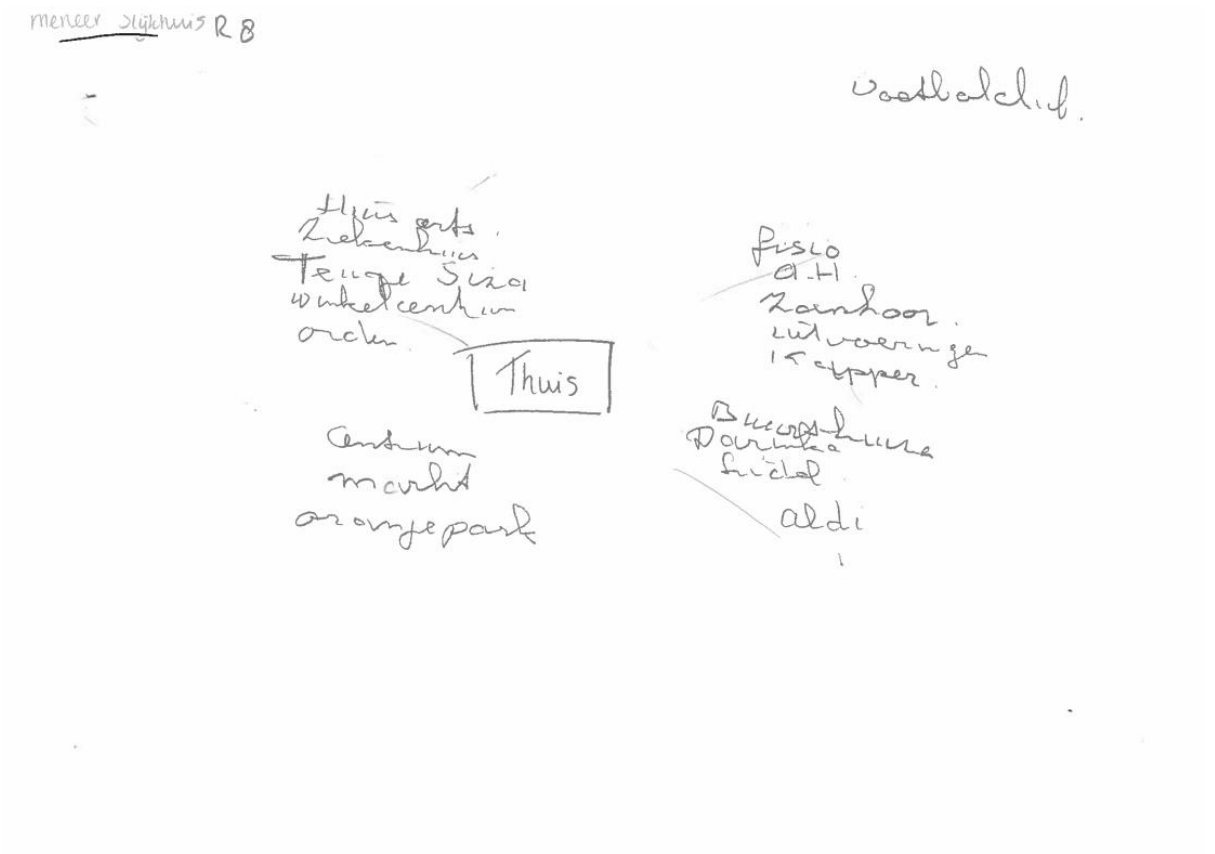
Mental Map 5 by R5



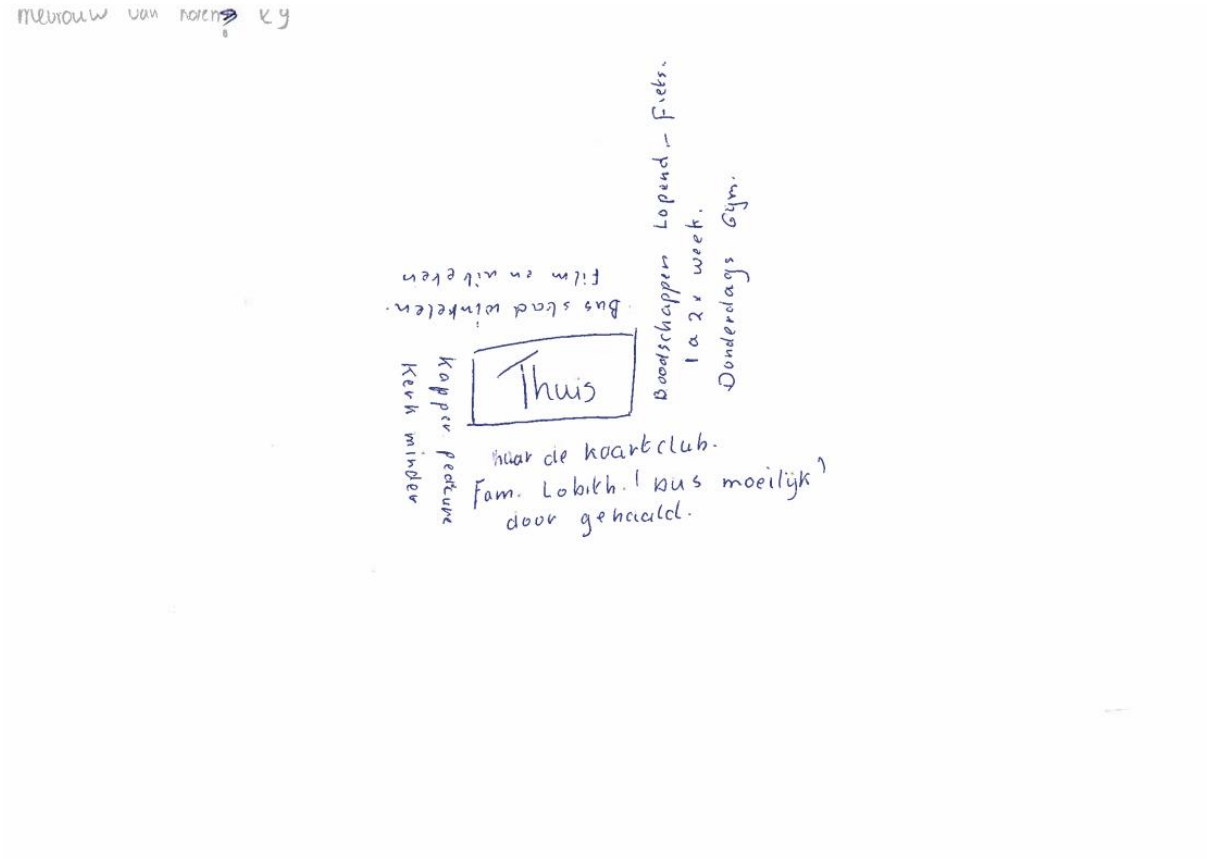
Mental Map 6 by R6



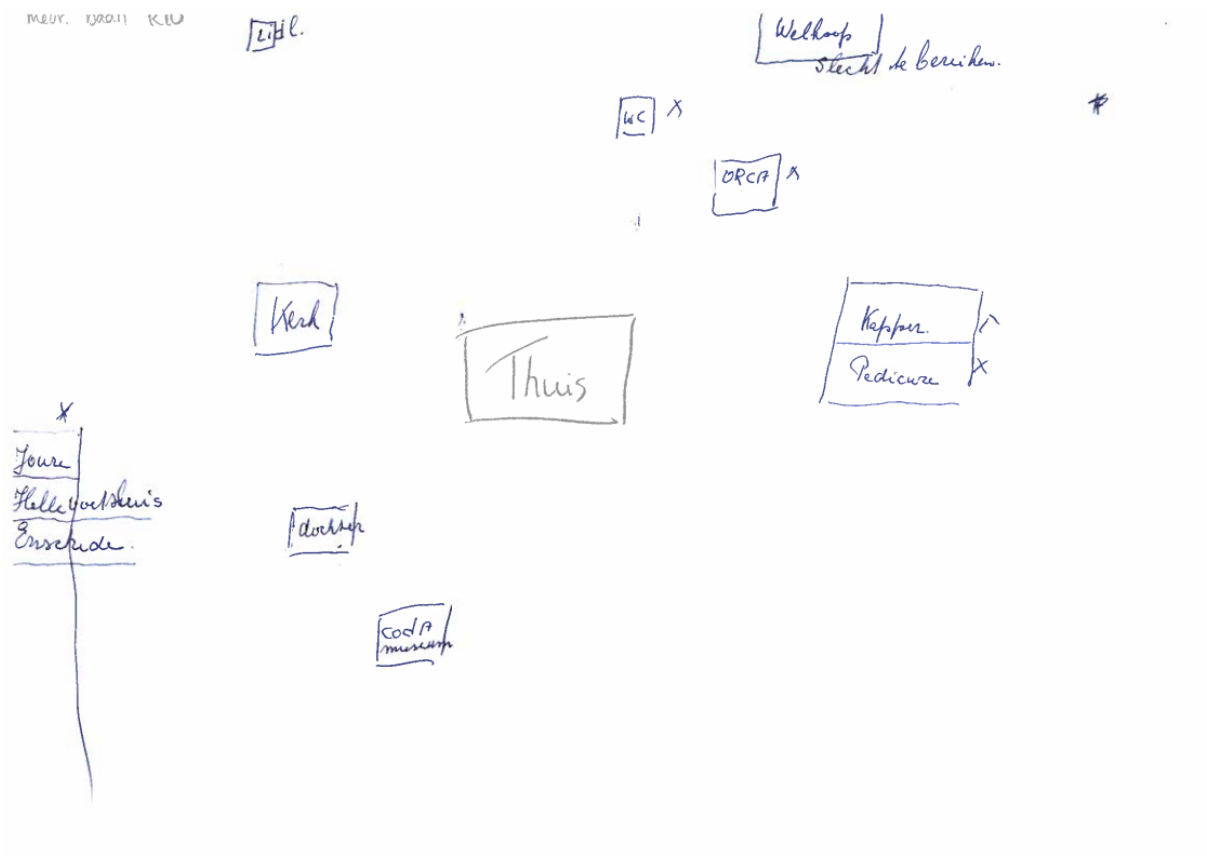
Mental Map 7 by R7



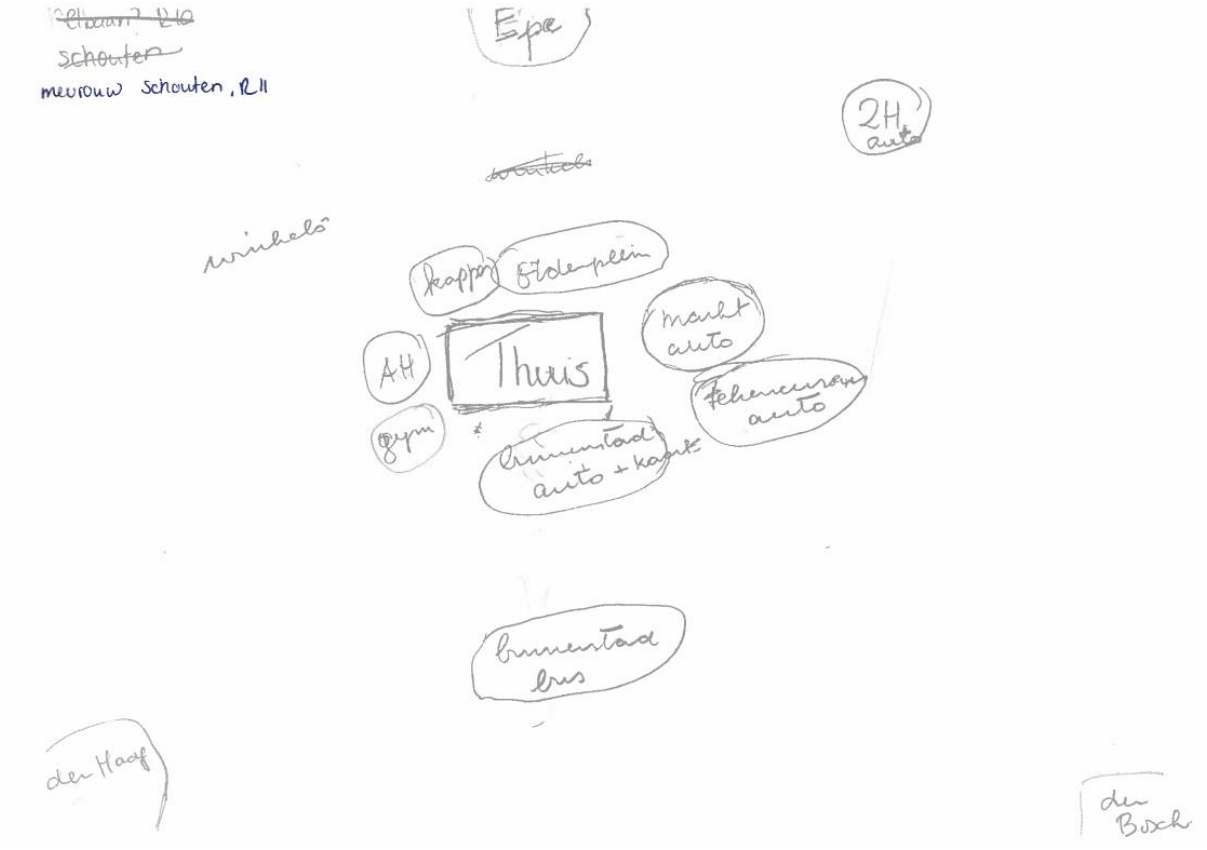
Mental Map 8 by R8



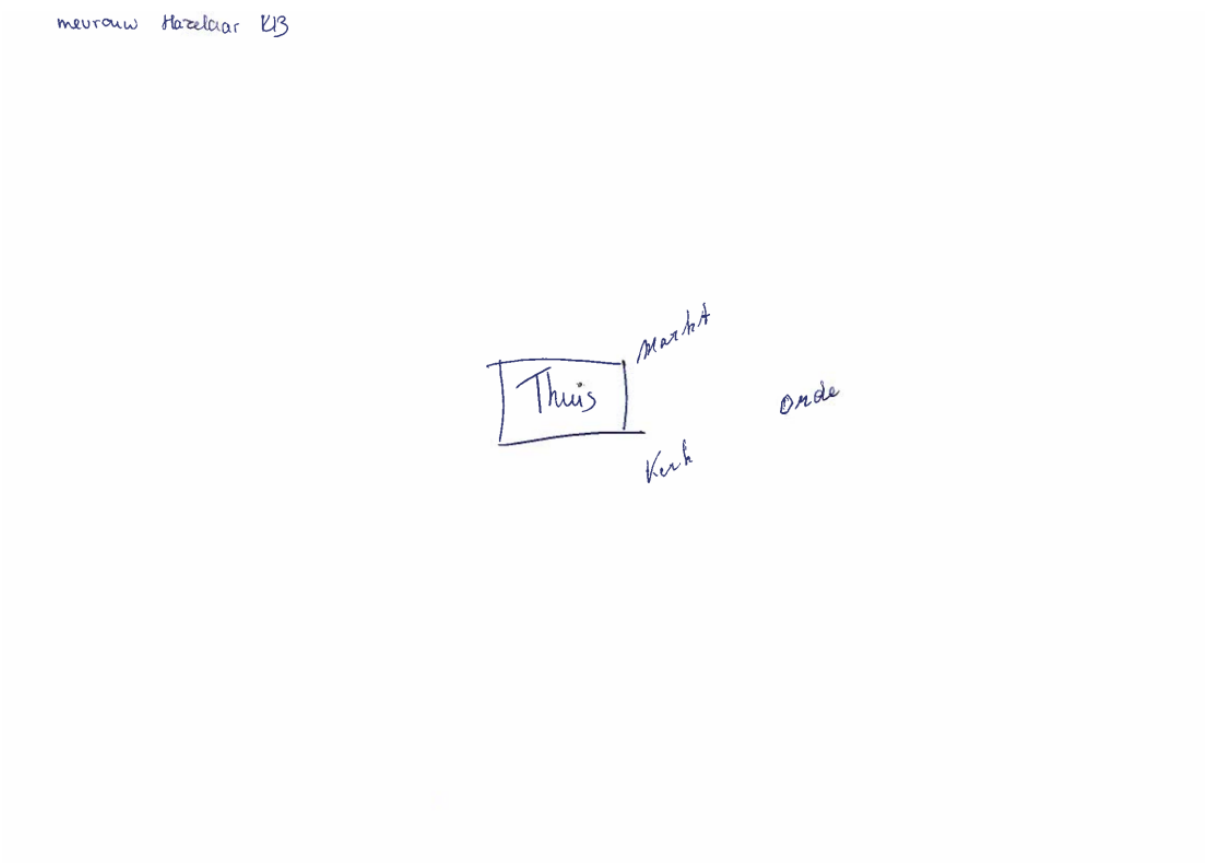
Mental Map 9 by R9



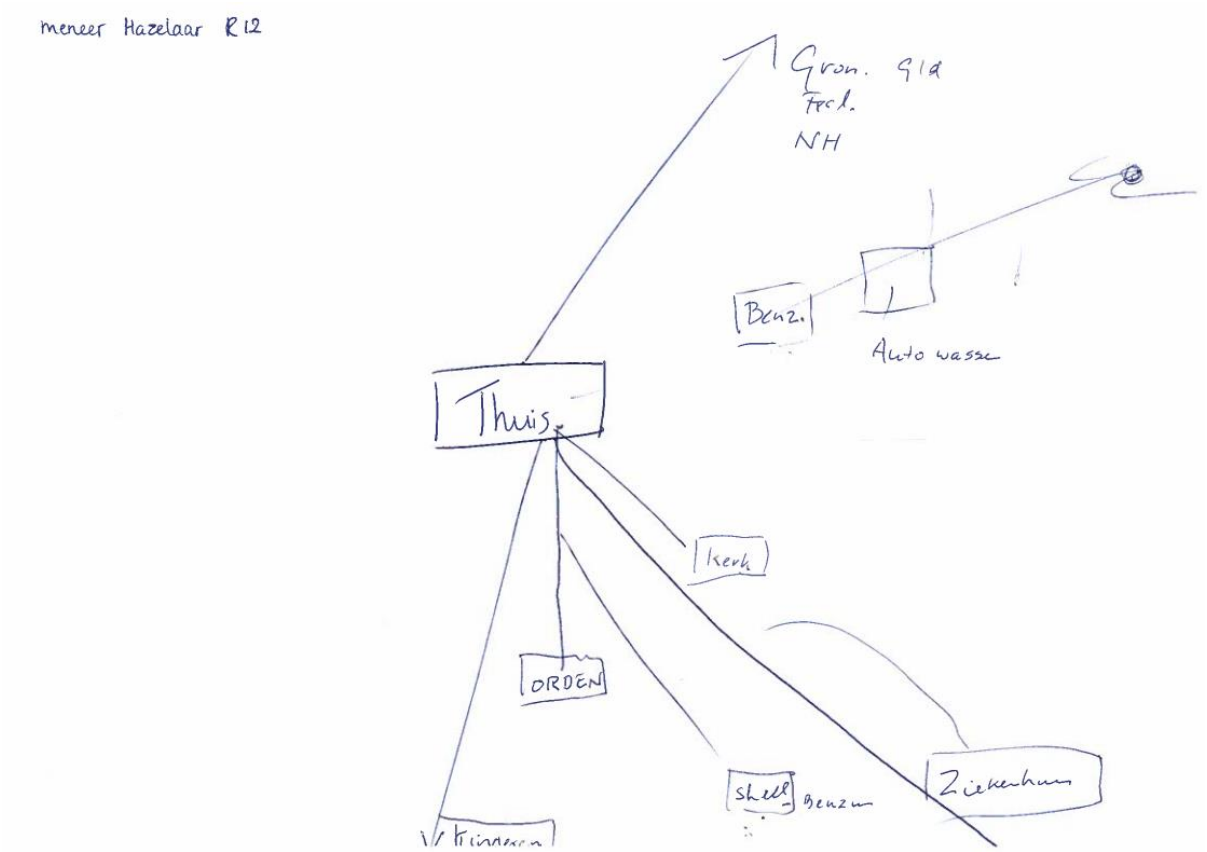
Mental Map 10 by R10



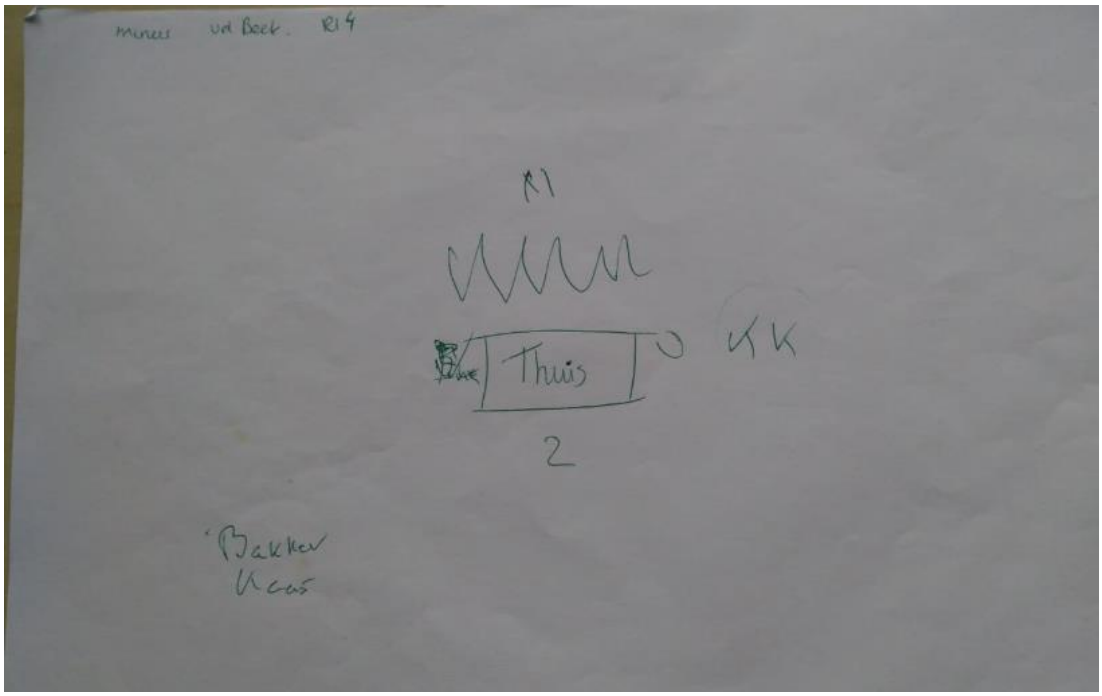
Mental Map 11 by R11



Mental Map 12 by R12



Mental map 13 by R13



Mental map 14 by R14

Appendix 8: Code scheme

	Code	Grounded	Code Groups
●	Activity: Attend Church	4	Activity
●	Activity: Baker	2	Activity
●	Activity: Biking	1	Activity
●	Activity: Bridgen	1	Activity
●	Activity: Cheese	1	Activity
●	Activity: Choir	1	Activity
●	Activity: Coffee	2	Activity
●	Activity: Day activity	4	Activity
●	Activity: Doctor	5	Activity
●	Activity: eye surgeon	1	Activity
●	Activity: Family visit	4	Activity
●	Activity: Forest/park	7	Activity
●	Activity: going out for dinner	3	Activity
●	Activity: Golf	2	Activity
●	Activity: Gym	2	Activity
●	Activity: Hairdresser	8	Activity
●	Activity: Hospital	5	Activity
●	Activity: Library	1	Activity
●	Activity: Market	4	Activity
●	Activity: Massage	1	Activity
●	Activity: Movie	1	Activity
●	Activity: Music event	3	Activity
●	Activity: Neighbourhood Stroll	2	Activity
●	Activity: no want to do alone	4	Activity
●	Activity: Pedicure	1	Activity
●	Activity: Pet care	1	Activity
●	Activity: Pharmacy	1	Activity
●	Activity: Physiotherapy	1	Activity
●	Activity: Playing cards	1	Activity
●	Activity: Post office	2	Activity
●	Activity: rehabilitation centre	1	Activity
●	Activity: Relaxing at home	5	Activity
●	Activity: Shopping	9	Activity
●	Activity: Supermarket	28	Activity
●	Activity: Swimming pool	1	Activity
●	Activity: Tennis	2	Activity
●	Activity: Unable	5	Activity
●	Activity: Unable visit family	1	Activity
●	Activity: Visit city centre	9	Activity
●	Activity: Visit family	15	Activity
●	Activity: Visit Family unable	1	Activity
●	Activity: Visit Friends	4	Activity
●	Activity: Visit Graveyard	1	Activity

	Activity: Visit villages	5	Activity
	Activity: Walking	5	Activity
	Activity: Walking the dog	1	Activity
	Comfort Factor: Cleanliness	0	Transportation Factors
	Comfort Factor: Conflict with other Modes	2	Transportation Factors
	Comfort Factor: Crime/police presence	6	Transportation Factors
	Comfort Factor: Lighting	2	Transportation Factors
	Comfort Factor: Other users	6	Transportation Factors
	Comfort Factor: Scenery	3	Transportation Factors
	Comfort Factor: Shade	1	Transportation Factors
	Comfort Factor: Traffic Speed	3	Transportation Factors
	Comfort Factor: Traffic Volume	5	Transportation Factors
	Comfort Factor: Weather	15	Transportation Factors
	Comfort Factors: Infrastructure design	4	Transportation Factors
	Comfort Factors: Pavement condition	5	Transportation Factors
	Health: Decision making	14	Personal Factors
	Health: Execution of actions	63	Personal Factors
	Health: Observation Skills	6	Personal Factors
	Impendance Factor: Costs	1	Transportation Factors
	Impendance Factor: Distance	61	Transportation Factors
	Impendance Factor: in-vehicle time	6	Transportation Factors
	Impendance Factor: Out-of-Vehicle time	3	Transportation Factors
	Impendance Factor: Topography	4	Transportation Factors
	Level-of-Service Factor: Benches	2	Transportation Factors
	Level-of-Service Factor: Continuity of route	1	Transportation Factors
	Level-of-Service Factor: Directness of route	12	Transportation Factors
	Level-of-Service Factor: Facility Widths	3	Transportation Factors
	Level-of-Service Factor: Hours of Operation	2	Transportation Factors
	Level-of-Service Factor: Service Frequency	8	Transportation Factors
	Level-of-Service Factor: Shelter	0	Transportation Factors
	Level-of-Service Factor: Signage	2	Transportation Factors
	Level-of-Service Factor: Signalisation	1	Transportation Factors
	Level-of-Service Factor: Vehicle Design	13	Transportation Factors
	Level-of-service factor: Volume/Crowding	5	Transportation Factors
	Level-of-Service: Information availability	5	Transportation Factors
	MoT: Bike	18	MoT
	MoT: Bus	7	MoT
	MoT: Car	43	MoT
	MoT: No need	33	MoT
	MoT: Pick-up family	13	MoT
	MoT: Pick-up friends	3	MoT
	MoT: Pick-up service	8	MoT
	MoT: Scootmobile	17	MoT
	MoT: Train	3	MoT
	MoT: Unable	9	MoT
	MoT: Unable Bike	9	MoT

	MoT: Unable Bus	4	MoT
	MoT: Unable car	2	MoT
	MoT: Unable Walking	1	MoT
	MoT: Unwilling	7	MoT
	MoT: Unwilling bike	0	MoT
	MoT: Unwilling Walking with Rollator	1	MoT
	MoT: Walking	8	MoT
	MoT: walking with cane	3	MoT
	MoT: Walking with Rollator	12	MoT
	MoT: Weelchair	3	MoT
	Related to Activity	0	Activity Factors
	Related to Activity: Atmosphere	16	Activity Factors
	Related to Activity: Crowds/lines	6	Activity Factors
	Related to Activity: Customer recognition	3	Activity Factors
	Related to Activity: Facilities	0	Activity Factors
	Related to Activity: Hours of operation	2	Activity Factors
	Related to Activity: Interior design	9	Activity Factors
	Related to Activity: Ownership	9	Activity Factors
	Related to activity: Price of products/services	4	Activity Factors
	Related to Activity: Quality of products/services	12	Activity Factors
	Related to Activity: Size and Scale	5	Activity Factors
	Related to design	0	Activity Factors
	Related to Design: Atmosphere	1	Activity Factors
	Related to Design: Density of activities at site	7	Activity Factors
	Related to Design: Landscape design	5	Activity Factors
	Related to Design: Mix of activities at site	15	Activity Factors
	Related to Design: Parking facilities	12	Activity Factors
	Social Network: Living situation	8	Personal Factors
	Social Network: Other relations	6	Personal Factors
	Social Network: Relation family	22	Personal Factors
	Terminal Factor: Intermodal coonnections	5	Transportation Factors
	Terminal Factor: Parking availability	3	Transportation Factors
	Terminal Factor: Terminal Design	2	Transportation Factors
	Terminal Factor: Terminal Locations	11	Transportation Factors
	Terminal Factors: Parking Costs	3	Transportation Factors
	Unknown Factor: Acceptance	4	Unknown factors
	Unknown Factor: Availability of activity	1	Unknown factors
	Unknown factor: Being outside	1	Unknown factors
	Unknown Factor: Combining activities on route	6	Unknown factors
	Unknown Factor: Denial of help	2	Unknown factors
	Unknown Factor: Dependend on others	13	Unknown factors
	Unknown Factor: Different Products / Services	11	Unknown factors
	Unknown Factor: Familiarity of location/activity	15	Unknown factors
	Unknown Factor: Fear	16	Unknown factors
	Unknown Factor: Feeling of independency	15	Unknown factors
	Unknown Factor: Feeling of safety	4	Unknown factors

●	Unknown Factor: forced to stop	6	Unknown factors
●	Unknown Factor: need to transfer	3	Unknown factors
●	Unknown Factor: no alternative options	1	Unknown factors
●	Unknown Factor: no desire to travel	1	Unknown factors
●	Unknown Factor: own precautions	24	Unknown factors
●	Unknown Factor: Passive behaviour	5	Unknown factors
●	Unknown Factor: Personality	14	Unknown factors
●	Unknown Factor: Punctual	2	Unknown factors
●	Unknown Factor: Recalcitrant	25	Unknown factors
●	Unknown Factor: Season	2	Unknown factors
●	Unknown Factor: Social activity	4	Unknown factors
●	Unknown Factor: Social Needs	33	Unknown factors
●	Unknown Factor: Take effort	2	Unknown factors
●	Unknown Factor: Time of the day	7	Unknown factors
●	Unknown Factor: Transfer time	0	Unknown factors
●	Unknown factor: Uncomfortable	1	Unknown factors
●	Unknown Factor: weight / amount of products/activities	1	Unknown factors

Appendix 9: Dutch abstract

Als mensen ouder worden, vermindert ook de mate waarin zij zich kunnen bewegen. Als een gevolg wordt ook hun mobiliteit en bereikbaarheid aangetast. De populatie ouderen stijgt komende jaren snel in Apeldoorn. Dit leidt tot nieuwe uitdagingen voor de gemeente, die het doel heeft al haar inwoners betrokken te houden met de maatschappij. Bij het plannen voor bereikbaarheid is het belangrijk dat rekening wordt gehouden met de wensen en behoeften van mensen. Onderzoek heeft echter uitgewezen dat bij het plannen voor de bereikbaarheid van ouderen, experts deze wensen en behoeften niet geheel goed kunnen inschatten: ouderen stellen andere prioriteiten dan de experts. Door gebruik te maken van ervaringen en inzichten van ouderen, heeft deze studie getracht de indicatoren die een rol spelen in hun ervaren bereikbaarheid in kaart te brengen. Uit het onderzoek komt naar voren dat ouderen in Apeldoorn overwegend positief zijn over hun bereikbaarheid. Dit komt allereerst doordat ouderen meerdere transportmogelijkheden tot hun beschikking hebben, die hen in staat stellen individuele- activiteits- en transport gebonden barrières te omzeilen. Ten tweede lijken ouderen te accepteren dat hun wereld kleiner wordt indien een barrière niet te omzeilen is. Als een gevolg is hun ervaren bereikbaarheid positief, ondanks dat zij wel minder plekken kunnen bereiken. Het onderzoek concludeert dat boven op de Activiteit- en Transport Factoren, de Persoonlijke Factoren een grote invloed uitoefenen op de perceptie van bereikbaarheid van ouderen. Bovendien hechten ouderen meer waarde aan specifieke indicatoren en minder aan andere indicatoren, wat suggereert dat ouderen hun bereikbaarheid inderdaad anders ervaren dan andere populatie groepen dit doen. De indicatoren die naar voren gekomen zijn in dit onderzoek blijken niet alleen direct de ervaren bereikbaarheid te beïnvloeden, maar lijken ook onderling invloed op elkaar uit te oefenen. Sommige indicatoren versterken elkaars invloed op de ervaring van ouderen terwijl andere indicatoren juist elkaar wegspelen en onbelangrijk worden voor de perceptie van bereikbaarheid.

Sleutelwoorden: Ervaren bereikbaarheid, Ouderen, Vervoersmiddelen, Indicatoren