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End of the Road?

Loss of (Auto)mobility Among Seniors and Their Altered Mobilities and Networks – A Case Study of a Car-Centred Canadian City and a Danish City

Fisker, Christian

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End of the Road?:

Loss of (Auto)mobility Among Seniors and Their Altered Mobilities and Networks
– A Case Study of a Car-Centred Canadian City and a Danish City

By Christian E. Fisker

PhD Dissertation

Department of Architecture, Design and Mediatechnology
PhD Programme in Planning and Development
International Doctoral School of Technology and Science
Aalborg University

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PhD Dissertation Review Committee

Antje Gimmler (Chair), Associate Professor, Deputy Director of the Centre for Mobility and Urban Studies, Department of Sociology, Social Work and Organisation, Aalborg University

Sven Kesselring, Research Centre Mobility and Transport, Technical University of Munich

Lise Drewes-Nielsen, Professor, Department of Environmental, Social and Spatial Change, Roskilde University

Academic Supervisor

Ole B. Jensen, Professor, Department of Architecture, Design and Mediatechnology, Aalborg University

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Thank you all.

Connections

It is true that here and there we can pounce on a moment when an individual sits fully astride a single role, head erect, eyes front, but the next moment the picture is shattered into many pieces and the individual divides into different persons holding the ties of different spheres of life by his hands, by his teeth, and by his grimaces. When seen up close, the individual, bringing together in various ways all the connections that he has in life, becomes a blur. (Goffman *Encounters* 1961, p.143)

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We drove up the 101 to Burlingame, driving and driving and driving and driving and driving and I realized that in the Valley, the formula really is NO CAR = NO LIFE. (Coupland *Microserfs* 1995, p.322)

Abstract

In many Western nations there is now a strong reliance on cars for mobility. At the same time the built environment has been highly configured around automobility at the expense of other potential forms of mobility. Also at the same time, Western nations are experiencing aging populations where many seniors will be faced with the inability to maintain their automobility as driving skills diminish or are eliminated completely. With everyday mobility in jeopardy, seniors will likely be confronted with having to reconfigure their mobility in an attempt to retain their networked connections to meet their needs. Utilizing a case study with a mixed methods approach, examining two different cities, Aarhus, Denmark and Mississauga, Ontario, Canada, this research project investigates what happens to the mobility and networks of seniors when their automobility is lessened or disappears completely.

The concept of mobility action chains is presented and utilized as a means of tracing out connections between the participants and their needs, and how these connections are configured and reconfigured. Utilizing this approach, one can see possible and actualized independent mobility, mobile with and mobile other arrangements within mobility action chains. In general, among the participants in both communities, the car brings forward a sense of freedom of flexibility in the timing and configuration of connections. While still being able to drive, in both communities seniors introduced self-regulating coping strategies, enabling, yet constraining, their continued car use in order to make connections. The coping strategies used by the participants in order to retain their connections to needs, after no longer driving a car, varied, with the Aarhus seniors relying more on non-car driving independent means of mobility, while also having mobile with and mobile other configurations, whereas the Mississauga seniors rely heavily on mobile with and mobile other configurations that are car based. In both communities, a growing reliance on mobile other arrangements can be seen as participants age. Through the use of mobility action chains, among the participants in the two settings under consideration, one can see the social, design and operational scripts that contribute to the creation, or reconfiguration of these chains, in order to retain connections between the self and needs.

Overall, the research project finds that in the case study settings considered, the mobility an individual is able to sustain, in order to meet their needs, at a given moment in time, is related to their motility and available potential coping strategies, including independent, mobile with and mobile other configurations, through their use of available mobility technologies and mobility infrastructures and, the built environment they are situated in and attempting to traverse.

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1.1   General Introduction

In many Western nations there is now a strong reliance on cars for mobility. At the same time the built environment has been highly configured around automobility at the expense of other potential forms of mobility. Also at the same time, Western nations are experiencing aging populations where many seniors will be faced with the inability to maintain their automobility as driving skills diminish or are eliminated completely. With everyday mobility in jeopardy, seniors will likely be confronted with having to reconfigure their mobility in an attempt to retain their networks and meet their needs. Utilizing a case study with a mixed methods approach, examining two different cities, Aarhus, Denmark and Mississauga, Ontario, Canada, this project asks and answers what happens to the mobility and networks of seniors when their automobility is lessened or disappears completely? Based on the findings of the research a discussion of the lessons for those involved in planning mobilities, networks and infrastructure in existing and new communities is presented.

1.2   Problem

In many Western nations there is a deep rooted acceptance and dependence on the automobile as an integral part of making one's way within a community and between communities, which has created a community structure that is dependent upon the ability to drive a car (Urry 2007). Sperling and Gordon (2009) describe a high dependence on automobility as a monoculture where automobility is a hindrance to the establishment and acceptance of other forms of mobility and where citizens no longer easily reflect on their mode of choice and simply get into their cars. Full automobility can be maintained as long as there is an ability to drive. A massive wave of baby boomers is starting to enter their senior years, having spent their adult lives with everyday life practices (Jensen 2009) holding a strong reliance on the automobile for mobility. Both European and North American populations are aging. Due to a significant post-World War Two baby boom, the North American population, while currently younger, is aging at a quicker rate than Europe. A significant number of North American seniors live in suburban communities designed around automobility, and as they continue to age in place they will potentially be faced with mobility issues (Rosenbloom 2003, Hodge 2008). Indeed, with age comes the potential for issues which will make driving no longer safe or physically possible (Kostyniuk and Shope 2009), thereby shrinking motility (Kaufmann 2002). This will bring a significant number of seniors to a point where they may have to make decisions such as self-regulating their driving activity (Rudman et al 2006), or deciding to stop driving all together (Kostyniuk and Shope 2003), or alternatively the decision will be made for them through a medical or regulated licensing process (Whitehead, Howie, Lovell 2006). For seniors who can no longer drive, they can become the immobilized

others of automobility (Thomsen 2004). Urry (2000, p.191) finds that not driving and not having a car is '…to fail to participate fully in western societies.' This loss in ability to use a key form of technology (car), within an environment that has been designed for its exclusive, or nearly exclusive use, and it continues to be 'locked in' to this technology (see Urry 2000, Urry 2003 and Richardson and Jensen 2008), can place the non-users in a considerable predicament. A better understanding of how this challenge is faced by individuals, and how they attempt to reconfigure their mobility can provide lessons for those involved in planning mobilities, networks and infrastructure in existing and new communities.

The mobilities turn has introduced a multi-disciplinary approach to considering mobility (Urry 2007). Initial research tended to delve into examples where large portions of populations are 'on the move' (Cresswell 2006), with less emphasis on individuals who may be marginalized (such as children, see Thomsen 2004) or immobile (Bauman 1998). Still others have begun to examine mobility infrastructures and technologies and how they create 'splintering' (Graham and Marvin 2001) and recast various forms of stratification, inequality (Richardson and Jensen 2008) and boundaries (Jensen and Richardson 2004). In addition, Featherstone, Thrift and Urry (2005) have explored the pervasiveness and complexity of the automobility 'system'.

Sismondo (2004) suggests that technology can be seen as an important cause of 'social structures' as they enable human action, that people act in the context of available technology and therefore relationships can only be understood in the context of technology. McLuhan (1964/1994) sees both cars and roads, among others, as technologies that extend human systems. Hall (1966) argues that humans need to pay much more attention to the kind of extensions that are created, not only for those that may easily use them, but also for others for whom these extensions are ill suited. With the intertwining of humans and technology Haraway (1991) sees challenges in determining where individuals end and where technologies begin, creating cyborgs. The outward extensions, utilizing technologies, can create networks (Latour 2005) of connections where relations can be seen as both social and technical (Law and Bijker 1992, Hughes 2004).

Outside of the mobilities turn, research has been undertaken examining medical conditions that may inhibit driving abilities, the potential skills required for driving which can degrade with age and adjustments made to driving patterns in an attempt to retain safe automobility (Kostyniuk and Shope 1998). As previously noted, both Hodge (2008) and Rosenbloom (2003) have highlighted that seniors residing in built environments designed around and requiring a high degree of automobility will present challenges in the near future. Now in its infancy, a number of scholars

are beginning to examine seniors' mobility (Siren 2005, Siren and Hakamies-Blomqvist 2004), yet to date, without exploring to any great degree the relationship to the built environment.

Many western nations are experiencing aging populations at varying rates. In general, people are living longer through a combination of better health care, diet and other factors. At the same time, many western nations are not experiencing the higher birth rates experienced in the past. This overall population aging can create a shifting demand for services as needs begin to move in emphasis from a youthful needs focus towards a mature needs focus.

Table 1 - Aging Populations - Selected Countries

Country	2010	2040 Projection	Increase 2010 to 2040
Denmark	Age 65+: 921	Age 65+: 1,495	Age 65+ increase: 574
	% Age 65+: 16.8%	% Age 65+: 26.3%	62.3% increase
United Kingdom	Age 65+: 10,414	Age 65+: 17,471	Age 65+ increase: 7,057
	% Age 65+: 16.9%	% Age 65+: 25.6%	67.8% increase
Germany	Age 65+: 16,815	Age 65+: 24,190	Age 65+ increase: 7,375
	% Age 65+: 20.3%	% Age 65+: 30.9%	43.9% increase
Canada	Age 65+: 4,642	Age 65+: 10,202	Age 65+ increase: 5,560
	% Age 65+: 13.8%	% Age 65+: 25.1%	119.8% increase
United States	Age 65+: 40,810	Age 65+: 82,749	Age 65+ increase: 41,939
	% Age 65+:13.2%	% Age 65+: 21.1%	102.8% increase
Australia	Age 65+: 3,070	Age 65+: 6,601	Age 65+ increase: 3,531
	% Age 65+: 14.3%	% Age 65+: 24.4%	115.0% increase
New Zealand	Age 65+: 549	Age 65+: 1,263	Age 65+ increase: 714
	% Age 65+: 12.9%	% Age 65+: 25.3%	130.1% increase

Source: Data is from OECD Factbook 2008: Economic, Environment and Social Statistics (online version). Figures are '000.

When compared to the United States, Canada, Australia and New Zealand, countries such as Denmark, the United Kingdom and Germany are already aged societies, yet they are all about to experience a period of rapid population aging. Table 1 provides more specific details on the aging of selected countries based on data from the Organisation for Economic and Co-operation and Development. The transition towards aging societies will introduce new challenges for countries such as the United States, Canada, Australia and New Zealand, with one of these important challenges being the mobility of seniors.

Many communities built since World War Two have been designed and built to address the demographic needs of the day, which to a high degree meant young families. The growth in acceptance of the car as a means of making one's way meant that uses that were traditionally in close proximity to one another could now be physically separated to a higher degree and still be

convenient due to the use of a car and the associated new road networks. In North America this was translated into planning policy documents that frowned upon mixed use and encouraged single uses in given areas with significant distance separations, thereby locking in the need to use a car as part of one's mobility (Graham and Marvin 2001). Wajcman (1981) captured the dilemma this form of settlement creates and the limited transportation options within it when she notes:

> Although the automobile did not create suburbia, it certainly expanded and accelerated this process. The promotion of mass motor-car ownership has tended to exacerbate a greater dispersal of residential settlement often without any other mode of transport to service such areas. (Wajcman 1981, p.129, as cited in Graham and Marvin 2001, p.128)

As Coughlin notes in an article written by Stromberg (2007, p.9) "Driving is so much a part of the American identity…Not being able to drive is not just giving up a certain mobility mode, but also changing how we define independence and freedom". All seems fine as long as one is able to continue to use a car. Yet, at the same time aging brings about changes in one's capabilities which introduces challenges to utilizing technologies, such as a car. In such circumstances one is faced with a situation where the powerfully convenient, flexible and available on-demand car is no longer available as an option, or is greatly diminished. This loss in ability to use a key form of technology, such as a car, within an environment that was designed for its exclusive or nearly exclusive use, and continues to be 'locked in' to this technology (see Urry 2003 and Richardson and Jensen 2008), can place the non-users in a considerable predicament. The mobilities turn has recast a way of thinking about mobility and how people's movements and connections are much more than simply physical or virtual movement. There is an existing wealth of research examining the technical aspects of movement and aging, such as reviews of activities of daily living (ADLs) or the biological or regulatory reasons why people stop driving (Fozard 2000) and the policy aspects of aging (Kalache and Kickbusch 1997). To date minimal research has attempted to bridge the gap between mobilities, as defined through the mobilities turn, and the existing technical research, in order to better understand the changing mobility and networks that occur with aging.

Taking these various elements together, we can consider how individuals build everyday lives that include social relationships involving diverse connections (Urry 2007, Latour 2005) for their needs (Hodge 2008, Urry 2007, Schwartz 1996, Siren and Hakamies-Blomqvist 2004) that are maintained through the use of mobility technologies and mobility infrastructures (Graham and Marvin 2001, Jensen and Richardson 2004, Volti 2004). How connections with needs are maintained changes with time, in part through changes in motility (Kaufmann 2002) and coping strategies (Lassen and Jensen 2004), bringing forth a time of possible reconfiguration of

independent and shared mobility arrangements and associated networks within a built environment that may hold social (Goffman 1959), design (Akrich 1992) and operational scripting (Goffman 1961) that assumes one can easily use the available mobility technologies and mobility infrastructures.

This research project provides a deeper understanding of what happens to the mobility and networks of seniors when their automobility is lessened or disappears completely in two different built environment settings, these being Aarhus, Denmark and Mississauga, Ontario, Canada. This is an area of limited existing knowledge, which has been acknowledged by the OECD (2001) and Fildes (2008). The Organisation for Economic Co-operation and Development (OECD) (2001) notes areas where additional research is required, including (a) determining, demonstrating and promoting the societal benefits of providing older people with continued, safe mobility, (b) recognizing the relationship between the built environment and aging, including improving land use planning with a view to aging in place and (c) research towards improving older people's crash avoidance and improve assessment and rehabilitation of older drivers in part to retain mobility. In addition, Fildes (2008) notes the knowledge gap in this area when he states:

> As the aging process continues and functional abilities critical for safe driving diminish, it is inevitable that most drivers will at some time face the very real possibility of having to stop driving. Thus they will be faced with the situation where they will need to adjust to life after the car…It is a difficult process for these people to accept as it has all sorts of associated implications; e.g., loss of independence and self-esteem, reduced social opportunities, difficulties in getting about, health implications, and so on.
>
> …There are anecdotal accounts of older people moving to a new home to minimize their need for personal car mobility, but this topic is not well researched. Further effort to appreciate the needs, actions, and responses of older people faced without a car yet requiring personal mobility would be a very fruitful area of research in the future. (Fildes 2008, p.391)

1.3   Proposition

Overall, the proposition established in advance of the research project, and confirmed by the research undertaken, is that, in the case studies considered, the mobility an individual is able to sustain, in order to meet their needs, at a given moment in time, is related to their motility and available potential coping strategies, through their use of available independent, mobile with and mobile other configurations across mobility technologies, mobility infrastructures and the built environment, all together comprising the setting they are situated in and attempting to traverse. This research provides a deeper understanding of seniors' mobility potentially in jeopardy and consequently contributes to planning future mobility related decisions and initiatives as it relates

to seniors' mobility. At the same time, the findings of this research lead to additional avenues that are worthy of investigation and are noted later.

1.4   Research Questions

The overarching research questions are:

a)   What happens to the mobility and networks of seniors when their automobility is lessened or disappears completely?, and,

b)   What are the lessons for those involved in planning mobilities, networks and infrastructure in existing and new communities?

Based on the general research questions we can delve deeper and consider the specific research questions that will be considered as part of this research project. The research questions are:

a)   Does the mobility and networks of seniors alter when there is a loss of automobility?

b)   If so, how is the mobility and networks of seniors altered or reshaped to compensate for a loss of automobility?

c)   Do seniors with a full command of automobility consider a future without automobility? Do they have a plan of action, or coping strategy, to alter their mobility and networks, should they be faced with a loss of automobility?

d)   If seniors' mobility and networks are altered by a loss of automobility, in what ways are they altered or reshaped and to what extent do they compensate for a loss of automobility? More particularly:

(i)   If a decision is made to stay in one's current home, what changes or adaptations are made to adjust, to maintain mobility and networks while no longer having automobility? Are they satisfied with the choices they have made?

(ii)   If a decision is made to move to alternative housing, in part to address a loss of automobility, how is that choice arrived at? Are they satisfied with the choices they have made?

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e)   What does the loss of automobility mean to seniors' understanding of themselves as social individuals and does it change their understanding of others?

f)   Through a comparison of the specific case studies, are there differences in automobility, mobility and networks, in terms of their paths, flows and frequency, pre, during and post a loss of automobility?

g)   What are the lessons for those involved in planning mobilities, networks, infrastructure and housing in existing and new communities?

The research project described herein compares and contrasts the circumstances of seniors living in a North American car-centred city and a European city, in terms of losing their automobility and its impact on their mobilities, networks and housing choices. The North American city considered in this case study research is the City of Mississauga. Mississauga, arguably considered by some to be North America's largest suburban community, has a population of 680,000 (Statistics Canada online data), is immediately to the west of the City of Toronto (population 2.5 million, Statistics Canada online data), is within the Greater Toronto Area (population 5.6 million), within the Province of Ontario (population 12.2 million, Statistics Canada online data), within Canada (population 31.6 million, Statistics Canada online data). More specifically, the focus of inquiry is on the Clarkson-Port Credit area in the southwest part of the city. The European city focused on in this case study research is Aarhus (population 300,000, Statistics Denmark online data), in Denmark (population 5.5 million, Statistics Denmark online data). More specifically, the focus of inquiry is on the Vejlby-Risskov area in the northern part of the city.

The research examines what happens to seniors in both communities who are confronted with a loss of automobility in terms of their altered mobilities and networks.

More particularly, this research project has included:

a)   reviews of existing research/literature regarding mobility and networks

b)   reviews of existing research/literature regarding the general mobility of seniors (driving, walking, scooters, public transit, accessibility, private transit and delivery services)

c)   reviews of existing research/literature, policy and program initiatives, and available statistics and trends regarding senior drivers in North America and Europe

d)   reviews of existing research/literature and available statistics, trends and infrastructure regarding seniors utilizing public and private transportation systems in Mississauga and Arhus

e)   reviews of existing public policy initiatives that address planning for an aging society and design issues related to seniors' mobility within communities

f)   undertaking a qualitative component which examines:

Currently Have Ability to Drive Seniors who have comfort and ability to drive (in Aarhus and Mississauga)	-what trips/activities is a car used for and what is the frequency? -are any trips taken without a car? -have they thought about what they might do in the future if they could no longer drive? -do they have friends who have lost an ability to drive, and has seeing their circumstances weighed into their thinking?
Loss of Automobility – **Deciding to Remain in Their Home** Seniors who have experienced a significant or complete loss of ability to drive and decide to remain in their homes (in Aarhus and Mississauga)	-what changes or adaptations have they considered in order to maintain mobility? -what changes or adaptations have been made in order to maintain mobility? -has any changes to their mobility and networks been as significant as they may have thought prior to the loss of the ability to drive? -what might they have done differently if they could do it again?
Loss of Automobility – **Deciding to Move to Alternative Housing** Seniors who have experienced a significant or complete loss of ability to drive and decide to move to alternative housing (in Aarhus and Mississauga)	-how was the housing choice arrived at and what were the key factors in the decision? -has the move brought about satisfactory results? -has any changes in their mobility and networks been as significant as they may have thought prior to the loss of the ability to drive? -what might they have done differently if they could do it again?

g)   undertaking a quantitative component utilizing data collected regarding the mobility and networks of the participants of the qualitative research, distances travelled/connected, by what means and network connections, and where appropriate, compare their mobility and networks pre and post a loss of automobility

h)   building a theoretical frame that presents a way of seeing the complexities in seniors' mobilities, including those who drive cars, various forms of connection reconfigurations that may bring about self-imposed constraints on driving such as self-regulation, alternative car and non-car based configurations and associated constraints therein among those who do not drive cars

1.5   Thesis Structure

Following this Introduction, we turn our attention to the theoretical frame. Here the overarching knowledge and theoretical approach for this research project is presented. Therein a review of the existing seniors and mobility knowledge is presented. Next is an overview of the human-built sociotechnical world, where we consider the mobilities turn, naked self, extensions of the self, including their enabling and constraining characteristics, followed by a discussion of mobility technologies, mobility infrastructures and built environments, including their design and operational scripts. This is followed by a presentation of the concept of mobility action chains that connect the self with needs through independent, mobile with and mobile other configurations and how these can evolve and characteristics of malleability and plasticity at any particular moment and across time. With the theoretical frame in place, we move on to a discussion of methods and how this project has proceeded as a case study with mixed methods, including empirical, qualitative and quantitative research methods. Next is a summary of findings and recommendations.

In laying out the structure as noted above, there is an attempt to work from an existing knowledge base and then transition some of these key elements into a broader sense within notions being developed through the mobilities turn and technoscience (Ihde 2009). In this sense we begin with a rather specific knowledge base from past research, before moving into seeing this knowledge through a wider mobilities turn lens. Building this theoretical frame has been a reiterative process over several years of research, moving among various spheres of knowledge on a regular basis, including the undertaking and review of findings from the empirical, qualitative and quantitative research described later.

CHAPTER 2 - THEORETICAL FRAME

2.1   Introduction

This theoretical frame begins with a review of past research on seniors' mobility among a variety of disciplines, including gerontology, sociology, psychology, occupational therapy, nursing and medical perspectives, policy studies and planning. Next is consideration of the current state of the mobilities turn, with a particular focus on elements that pertain to the mobility of seniors, including where mobility may be in jeopardy. From this initial consideration of past research, through to our investigation of the present day mobilities turn, we then move towards the development of new concepts that can be infused into the mobilities turn as a means of capturing still further the mobility complexities of modern everyday life.

2.2   Knowledge and Theoretical Approach

Ihde (1993) and Haraway (1991, p.188) argue that perception comes from a particular vantage point, or multiple vantage points. Beginning with a phenomenological perspective grounded in Husserl, Merleau-Ponty and Heidegger, Ihde brings forward a postphenomenological approach that distinguishes between a microperception, where the emphasis is focused on bodily-sensory dimensions, and a macroperception, where the emphasis is focused on cultural-hermeneutic dimensions (Ihde 1993, p.75). Ihde describes how the microperception can easily be associated with the perceptualism of Husserl and Merleau-Ponty, while the macroperception is associated with the more cultural perception of Heidegger and Foucault (Ihde 1993, pp.75-76). Ihde clearly acknowledges that his approach, involving relationality analysis, the central focus on variational theory, and the resulting multi-perspectival and multi-stable effects, and the importance given to extended embodiment, most certainly draw from classical phenomenological thinking, yet it is not strictly modelled on the older approaches (Ihde 2003a, p.135). Ihde argues that there is an interrelationality between microperceptual and macroperceptual dimensions. In his own words:

> The matter may be put simply: there is no bare or isolated microperception except in its field of a hermeneutic or macroperceptual surrounding; nor may macroperception have any focus without its fulfillment in microperceptual (bodily-sensory) experience. Yet in the interrelation of micro- and macrodimensions of perception, there may lie hidden precisely the polymorphic ambiguities which most particularly emerge in the later work of Merleau-Ponty and Foucault in particular. (Ihde 1993, p.77)

Utilizing Ihde's approach, including bodily extensions and the related polymorphous experience, Olesen notes the plurisensorial sense of microperception where the car driver experiences the road and surroundings *through* the activity of driving, and can be expanded further still (Olesen

2006, p.241). Expressing the malleability and multistability of the endlessly possible technologically mediated relations, Olesen (2006) writes:

> …our sense of our body is polymorphous: our body experiences are not predetermined but rather malleable and reducible in correlation to those technological mediations the body is able to take in. The sensing body may just as well be a (listen-with-the-stethoscope) body as well as a (drive-in-the-car) body, or something entirely different. It depends on the situation and the already constituted technologically mediated relations. The body can thus be described as *multistable.* (Olesen 2006, p.242)

Ihde argues that (1) ambiguities are not simply polymorphic, but are 'structured multistabilities', (2) by following his approach to phenomenology perception, with the links between micro and macrodimensions, then clues will become evident as to the shape of these structures, and (3) what emerges is a recognition that without an enlarged perceptual analysis, a large swath of existential domain is overlooked (Ihde 1993, p.77). Mitcham (2006, p.31) describes Ihde's approach as pragmatic phenomenology. Ihde himself acknowledges that 'pragmatic threads' and the 'empirical turn' of science studies have been brought into his 'contemporary phenomenology' (Ihde 2009, p.3 – see also Ihde 2003b). Drawing upon many of Ihde's notions, Verbeek (2005, p.112) argues that this new interpretation of phenomenology can emphasize that the subject and object constitute one another, noting that "Human beings can only experience reality by relating to it, which does not involve any reality-in-itself but rather reality-for-them."   Utilizing Ihde's notions of macroperception and microperception it is possible to proceed with research here that is investigating both perceptions at the same time, and the interesting and complex linkages between the two. At the same time, we subscribe to Jensen's (2009) 'critical mobilities thinking' where we investigate social phenomena, the taken-for-granted understanding of mobility and see that our lives are not just what happens in static enclaves.

2.3   Seniors and Mobility

2.3.1   Introduction

In order to best understand how this research can contribute to a deeper understanding of seniors and mobility, an extensive literature review was undertaken. This review was not confined by any traditionally conceived disciplines and included studies undertaken from sociological, psychological, gerontological, geographical, architectural, engineering, occupational therapy, community planning, nursing, medical and other perspectives. These various perspectives have contributed to a knowledge base that, when seen as a whole, tells the story of how life as a senior is a time of mobilities potentially in flux and in jeopardy of diminishing. This section should not be seen as simply the small, narrow stepping stones creating a direct path across a river, linking us to the knowledge we will utilize in our pursuits here. What follows is a

wider contextual view, permitting us to see a wider terrain and some of the numerous complex relationships. In a sense this section opens the ground to what has come before, providing us with the deep, lower part of a foundation for our theoretical frame. Shortly, there is a brief discussion of past theoretical person-environment models. Next is an investigation of seniors' quality of life and its relationship to mobility. This is followed by a look at diminishing skills and coping strategies. Next is an investigation of seniors and automobility. This is followed by discussions of social networks and planning for aging communities.

2.3.2   Theoretical Person-Environment Models

A number of gerontologists, within a subfield often described as environmental gerontology (Wahl and Weisman 2003), have developed person-environment models (Lawton and Nahemow 1973, Kahana 1982, Carp and Carp 1984) that utilize Lewin's *Field Theory in Social Science* (1951) as their foundation (Cvitkovich and Wister 2001). Lewin (1951) proposed that an individual interacts with a 'life-space' that includes the person, the physical space of the interacting environment and the 'psychological space' within which the person environment takes place (Cvitkovich and Wister 2001). Cvitkovich and Wister (2001) argue that these various models use two basic approaches for understanding the interaction between aging and one's environment, with Lawton and Nahemow (1973) using a person-environment competence approach, and Kahana (1982) and Carp and Carp (1984) using a person-environment congruence approach. Each of these models is explored briefly here.

Lawton and Nahemow (1973) developed a model of adaptation and aging, where outcomes are viewed in the dual outcomes of adaptive behaviour and positive versus negative affect. They suggest a limited aspect of the individual, competence and a limited aspect of environmental press, demand quality, as the 'transactional' terms that are most clearly seen both conceptually and operationally impacting the environment on aging and behaviour. Lawton (1975) defines competence as the 'theoretical upper limit of capacity of the individual to function in the areas of biological health, sensation perception, motoric behaviour, and cognition'. As one's competence decreases, the quality of outcomes becomes increasingly determined by environmental press. As press strength increases, beyond a certain level, no level of personal competence can create a positive outcome. By 1977 Lawton was aware of Chapin's early 'activity patterns' research, bringing Lawton to state that knowing the locations where different behaviours occur and their relative importance can provide clues on the attraction of locations and their degree of congruence of environments to the needs of specific user groups. Kahana (1982) and Carp and Carp (1984) criticized Lawton's model as being too focused on negative environmental demands and the passive role of the individual without 'considering the positive aspects of the environment or the possibility that individuals can play an active role in changing the environment and

improving competence' (Cvitkovich and Wister 2001, p.3). Expanding on the work of Kahana (1982), Carp and Carp (1984) brought forward a conceptual congruence model. According to Cvitkovich and Wister (2001, p.3), this model emphasizes the importance of meeting both life maintenance needs and higher order needs and further:

> Congruence of the environment with LM [life maintenance] needs measures how resources or barriers compliment or compensate personal competence relevant to activities of daily living (ADLs). Congruence of the environment with HO [higher order] measures the availability of environmental resources to meet the individual's needs. (p.3) (square brackets added here)

Through an unpublished work, in 1987, Lawton modified his model plot parameters to represent personal resources, instead of competence, and present environmental resources, instead of environmental press, thereby bringing his model closer to Carp and Carp's (Cvitkovich and Wister 2001). Regardless, Cvitkovich and Wister (2001) observe:

> …that current publications continue to use Lawton's original ecological model to teach the dynamics of P-E [person-environment] transactions and this model has become the accepted paradigm for gerontological research. The rationale for a specific gerontological application of P-E theory, therefore, rests with the view that a person's ability to cope with the environment declines significantly with age or disability. (p.3) (square bracket added here)

Reviewing the state of environmental gerontology, Wahl and Weisman (2003) find that due to the diversity of approaches and foci:

> …theoretical approaches and empirical research strategies within EG [environmental gerontology] are challenged to address very different levels of analysis regarding both place type and scale of social aggregation (from the home to neighbourhood, to city, and to rural region as well as individual, to group, to organization) and very different processes (such as perceptual, cognitive, and affective)…One may thus conclude that pluralism – in terms of theory, empirical research, the application of findings, and value issues – is among the most essential characteristics of EG. (p.617) (square brackets added here)

Person-environment models capture only part of what the mobilities turn has focused on, when considered from the perspective of an individual who may or may not have the skills necessary to perform certain tasks and the friction to physical mobility that may be related. What is helpful from these models is the concept of adaptation, which is considered as 'coping strategies' later in this theoretical frame. What is also helpful is the notion of connecting individuals with needs across an environment or setting. This will resurface later in this theoretical frame, in the relationship between a person attempting to connect with needs and how this is attempted.

What is not easily captured with person-environment models, and can be addressed through a mobilities turn approach, is the sociotechnological aspects and the ability for an individual to work with others in order to bring about connections and what these networked connections look like, be they 'physical' or 'virtual'.

2.3.3   Quality of Life

Expressing that mobility is indeed an important part of quality of life among seniors, yet is not commonly found in scales of quality of life, Mollenkopf and Walker (2007) note:

> Two further components which are rarely addressed in generic QoL [quality of life] scales and research turned out to be of great importance to older people: activities and mobility. Both aspects are closely interconnected, and their significance for an autonomous and meaningful life in old age becomes obvious in the light of the age-related increase in mobility restrictions. That applies especially to modern societies where mobility is not only a fundamental precondition for overcoming the growing distances between functional areas but also constitutes a highly appreciated societal value. (p.239) (square brackets added)

Others have also found that mobility is an important condition for the quality of life of seniors and their independence (Wahl et al 2007, Giuliano et al 2003, Tacken 1998, Farquhar 1995). Quality of life is commonly used as an 'endpoint' in the evaluation of public policy; for example assessing the outcomes of health and social care, reflecting macro, societal, micro and individual influences holding a collection of interacting objective and subjective dimensions (Bowling 2007, p.15). Going still further, Bowling (2007) suggests that quality of life:

> …theoretically encompasses the individual's physical health, psycho-social well-being and functioning, independence, control over life, material circumstances and external environment. It is a concept that is dependent on the perceptions of individuals, and is likely to be mediated by cognitive factors… (p.15)

The Seniors Education Centre at the University of Regina has produced a useful figure (shown here as Figure 1) that shows how the various domains of what contribute to quality of life are interdependent and all require an ability to 'get around' (University of Regina, Seniors Education Centre 2000, as found in Hodge 2008).

Figure 1 – Seniors' Quality of Life Factors
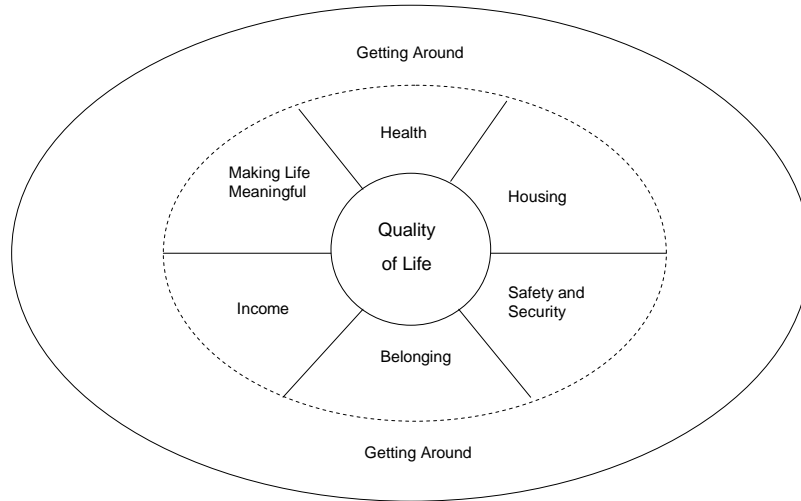
Adapted from University of Regina Seniors
Education Centre 2000, as found in Hodge 2008

Loss of mobility can be seen as resulting in a substantial diminution of well being, which can happen when a person can no longer safely drive a car or when physical movements are significantly hindered through age related disabilities (Metz 2000). Yet, this very prized mobility is endangered and vulnerable as one advances in age (Tacken 1998). Föbker and Grotz (2006) find that 'contentment' is not solely derived from an objective view of a residential area. Instead it is derived from the complex and dynamic interaction of people and their social, natural and built environment. In his research of 28 participants in greater Boston, Massachusetts, Coughlin (2001) finds that all of the participants feel that mobility is a critical element of overall 'life satisfaction', both for the daily necessities of life and for maintaining social links with family, friends and community. Banister and Bowling (2004) find a positive link between seniors' self assessed quality of life and the number of activities they participate in and that those who use cars consistently have more social activities. In a study of the out of home mobility of seniors in five European countries (Finland, Netherlands, Germany, Hungary and Italy), Wahl et al (2007, p.118) find that out of home mobility factors contribute significantly to the quality of life of seniors. Furthermore, Wahl et al (2007) find that:

> The strong impact of the objective and subjective aspects of being able to
> undertake activities for satisfaction with life and emotional well-being supports
> the hypotheses, that in modern society older adults' QoL [quality of life] is
> affected by these mobility aspects. (Wahl et al 2007, p.118) (square brackets
> added)

Based on the research noted above, there is indeed a relationship between seniors' quality of life and their ability to be mobile in order to connect with various domains of their lives.

2.3.4 Diminishing Capabilities, Risks and Coping Strategies

With age many seniors experience a decline in functional capabilities which can reduce the 'activities of daily living' and develop mobility difficulties that restrict the physical things they can do (Hendrickson and Mann 2005, Tacken 1998, Zimmer and Chappell 1994). As an overview to the typical changes one experiences with age Fozard (2000) notes:

> Three facts about aging have been documented in many contexts and situations. The first is that at older ages, speed of behavior becomes slower; the slowness affects sensory function, mental activities, and motor activities such as walking, controlling a vehicle, and making other skilled manual movements. The second is that with older age (70+), the interrelationships among sensory and cognitive performance increase. This is reflected in higher correlations among measures of sensory and cognitive tasks. The third is that with older age, skilled performance requires relatively more sensory information from the environment than is the case in younger adulthood; such as, the relatively greater importance of high quality lighting for visual guidance or adjustment of walking or manual maneuvers or the greater interdependence of postural and visual information for maintaining balance. (Fozard 2000, p.1)

More specific examples can include challenges with walking up or down stairs (Tacken 1998, Zimmer and Chappell 1994), walking (Tacken 1998, Zimmer and Chappell 1994), getting in or out of a car (Zimmer and Chappell 1994), standing up, vision, hearing, driving and riding a bicycle (Tacken 1998). As Fozard (2000) notes, cognition and response times can be diminished, thereby making physical movements and use of technologies challenging. There can also be a raised sense of vulnerability with age that results in safety concerns (Föbker and Grotz 2006, Fonad et al 2006). All combined, these diminishing capabilities can contribute to a contraction in overall physical mobility. For example, a large longitudinal study of Dutch seniors (n=2,109) finds that physical mobility performance declined for 45.6% of the group over three years and that physical activity appears to extend or protect physical mobility (Visser et al 2002). A study of disabled seniors living in western New York and northern Florida finds that the travel distance of seniors, in their current circumstances, was significantly less than their distances of travel six and fifteen years earlier (Hendrickson and Mann 2005).

Technological devices, such as assistive devices have the potential to maintain or increase one's quality of life (Zimmer and Chappell 1994). For example, in a study of seniors living in Manitoba, Canada, Zimmer and Chappell (1994) find that 60% of their respondents with trouble going up and down stairs use a technological device of some sort (such as a cane), and only 8% of those

who have trouble getting in or out of a car use a device to assist with this task. As physical challenges add up, the likelihood of using a device of some sort increases, demonstrating a strong relationship between the number of difficulties a senior has and the use of devices (Zimmer and Chappell 1994). While there has been much research on the use of social supports by the elderly with physical mobility problems, there has been minimal research of the use of high (such as electronic walkers and lifts for baths) and low (such as a cane, hand rails and simple walkers) technology devices (Zimmer and Chappell 1994). Separate from introducing technologies in order to continue certain movements or connections, one has the option of temporally altering their movements or, changing the type of movements or, patterns made in order to achieve or maintain mobility. Examples include changing when one does something in order to avoid crowds, or avoiding rush-hour or busy highway traffic, or changing the mode of travel to one that is feasible from a competency perspective (Schwanen, Dijst, Dielman 2001).

Along with diminished capabilities, seniors have a heightened sense of risks to their mobility safety. Finalyson and Kaufert (2002) have explored the sense of perceived risks to mobility among senior women. In general they find two types of risks, these being (a) continuous risks and (b) unpredictable risks. Continuous risks include knowledge of unsafe conditions within a neighbourhood and awareness of one's lessened capabilities or vulnerabilities, such as physical or cognitive. Finlayson and Kaufert (2002) find that trips continued with adaptations to overcome the challenges faced. The unpredictable risks included bad weather, uncertainties caused by travelling after dark and possible confrontations with strangers. Reviewing this research Hodge (2008) notes:

> The women developed various coping strategies either to minimize these perceived risks or to avoid them altogether. This might involve not traveling at all, say, in bad weather or after dark (which was the prevalent response of those with mobility limitations), or using a different mode of travel such as a taxi or traveling with a friend. (Hodge 2008, pp.122-123)

Finlayson and Kaufert (2002) produced a figure on perceived risks to mobility based on their findings, which is presented here as Figure 2.

Figure 2 – Mobility Coping Strategies of Senior Women

```
                    ┌─────────────────────────────────────┐
                    │      PERCEIVED RISKS TO MOBILITY     │
                    │                                      │
                    │  Unpredictable Risks   Continuous Risks │
                    │  -weather              -neighbourhood │
                    │  -time of day           hazards      │
                    │  -confrontations       -personal fears│
                    └─────────────────────────────────────┘
                                                   ┌──────────────┐
                                                   │ Limited influence │
                                                   │ on community │
                                                   │ mobility     │
                                                   └──────────────┘
        ┌──────────────┐      ┌──────────────┐
        │ Women with   │      │ Women with no│
        │ limitations on│     │ limitations on│
        │ mobility     │      │ mobility     │
        └──────────────┘      └──────────────┘
        ┌──────────────┐  ┌──────────────┐  ┌──────────────┐
        │ Bad Weather  │  │ Daytime Strategy:│ │ Nighttime Strategy:│
        │ Strategy:    │  │   AVOID      │  │ AVOID TRAVEL or│
        │ AVOID RISK   │  │ CONFRONTATION│  │ CHANGE MODE  │
        └──────────────┘  └──────────────┘  └──────────────┘
```

Adapted from Finlayson and Kaufert 2002 and Hodge 2008

With regards to avoiding travel or changing mode of travel, Finlayson and Kaufert (2002) note:

> The discussions that evolved during the interviews with the women who were independently mobile highlighted the complex and interactive nature of the risks they encountered during their evening travels. Although the women typically were using the same buses and transfer points or parking lots during the day, being at these locations in the evening increased their perception of risk. What made the transfer points unpredictable in the evening were the same people that made them unpredictable during the day – beggars, vagrants, and gangs of teenagers who hung around and asked for money. However, the daytime strategy of dealing with threatening people in a non-confrontational manner became inadequate in the evening. (Finlayson and Kaufert 2002, p.81)

With regards to avoiding confrontations, Finlayson and Kaufert (2002) state:

> During the interviews, safety was a commonly identified factor that made mobility in the city difficult for the women, particularly those who were independently mobile. Beggars, vagrants, and gangs of teenagers whom they encountered while riding or waiting for a bus made the women feel uncomfortable. When one woman was asked if she ever felt unsafe, she responded:
>
>> I feel uncomfortable. I'm afraid that something is going to have to happen before I feel unsafe. I feel uncomfortable. (Finlayson and Kaufert 2002, p.81)

A common way of minimizing the risk of confrontation with potentially threatening people was to ignore them. Still, with an ability to adapt, one is faced with their personal competency being stretched or brought to its limit in a particular setting. One can reach a point where adaptation, available in a particular setting, has been achieved to its fullest extent, where competencies are greatly diminished and the friction, or risks or challenges of overcoming obstacles can lead to an inability to move and be mobile. Bendixen et al 2005 find that the number of places visited by seniors, and the number of trips taken are impacted by declines in functional and psychosocial status. Further, Bendizen and colleagues (2005) find that as what they call the 'home range' declines, self-esteem also declines.

From the perspective of family members, an immobile relative potentially introduces new demands, obligations and challenges to provide assistance. This assistance can place pressure on already in place demands and mobility patterns of those providing assistance to seniors. In an era of families being geographically dispersed, this introduces a friction of distance that might be less so if relatives lived in close proximity to one another. Phillips and Bernard (2008) note:

> …caring at a distance has become an important issue for many geographically mobile families, for whom cross-national and international migration is common place. However, … longer distances of necessity tend to change the kind of care that can be offered. In one sense, then, distance very much imposes boundaries on care – at least on the practical and intimate tasks that might need to be performed. On the other hand, distance has become blurred and compressed by the advent of modern technologies that enable emotional, if not practical, support to be given in ways not accessible to previous generations of carers. (Phillips and Bernard 2008, p. 93)

Demonstrating the time and distance challenges faced by a woman in England, who is the full-time manager of a social services daycare unit for seniors, who also is providing daily care to her 81 year-old mother-in-law, as noted in research by Phillips and Bernard (2008):

> I need to be in work at 8 in a morning and I finish about 5. I was going from [home] to [my mother-in-law's] in a morning to get her washed and changed…I was going back after work… it is an hour's journey from here [work] to her house and then another hour back home. So, it was adding another six hours on to my working day. (Phillips and Bernard 2008, p. 94)

A study which delved into how strong or light the distance crossed is, in order to provide care to a senior family member and including gender aspects, can be found in Joseph and Hallman (1998). In their findings they state:

Our results lead us to encourage a more active engagement with the spatiality of caregiving, specifically within studies of work and family issues, and more generally in research on health and aging. Of course, the insertion of geographical variables into models of eldercare provision needs to see beyond the highly gendered nature of caregiving to embrace the equally gendered spatial context in which caregiving is embedded; in our sample, women invariably travel farther, more often, to provide informal eldercare than do their male counterparts. This appears to be yet more evidence of the sharpness with which contrasts in gendered geographies are drawn and how they mirror the relationship between the public/private and male/female dichotomies, for the longer "journey to care" of women stands in stark contrast to the longer "journey to work" of men… (Joseph and Hallman 1998, p.638)

Here we begin to see some of the competing needs that are at play within a family. There is a need to earn some form of income in order to cover the costs of one's existence. At the same time there is a need to care for those who are facing frailty and challenges of various sorts, including mobility. Care providers attending an immobile senior's home can include volunteer and paid care providers. These mobile providers are likely visiting multiple immobile individuals and crossing distances between locations in their everyday activities. Twigg (2008) argues that:

The care worker is – ideally – secondary, enabling disabled people to do what they want to do, in their own time and at their own time, so that temporal ordering, scheduling, and the pace of the activity are determined by the frail older or disabled person. But the reality of time scheduling in the work context means that all too often the desires of the older person are made subordinate to the requirements of the care system. Care proceeds at the pace and the times that providers determine. (Twigg 2008, p. 235-236)

Here we see the competing interests of a relatively immobile person, needing care, and that of careworkers attempting to address the needs of a dispersed group of relatively immobile individuals. Twigg (2008) further states that:

Carework… is one of the sectors in the new economy that cannot be transferred across traditional spatio-temporal boundaries; it's very materiality and closeness to the body mean that it has to be performed locally, close, in the home and on the bodies of the recipients. (Twigg 2008, pp. 233-234)

Indeed this is the case when providing formal and informal assistance to immobile seniors in their own homes. A variation on this is where an immobile senior has moved to some form of housing with other immobile seniors. This brings forth a community, or node, of immobile seniors and family, friends and care providers coming to the immobile community in a reconfigured network of mobilities. Different countries have different health care and social policies that contribute to different care worker arrangements. Keefe et al (2008) note that in some countries, in particular in the Scandanavian countries, seniors have access to a relatively extensive and publicly funded health care system. In other countries, there is support for family care givers based in part on a

social policy that is based on mutual obligation between the state, individuals and families. With all the above examples, immobility is bringing about altered mobilities, not just for seniors, but also for others, through the establishment of a new mobility node and network constellation with those who are relatively immobile at its centre.

2.3.5   Seniors and Automobility

Seniors hold on to their cars as long as possible in order to retain their mobility (Rosenbloom 2001). Seniors with driving capabilities have a higher degree of physical mobility than those who do not drive (Hendrickson and Mann 2005). Based on data from the United States, Australia, Germany, New Zealand, Norway and the United Kingdom, Rosenbloom (2001) finds that in spite of differences in cultures and policy, older people, regardless of the countries noted, are more likely to hold a driver's license, to make more trips, do this more as a driver, as opposed to as a passenger, than seniors a decade earlier. At the same time they are less likely to utilize public transit (Rosenbloom 2001). Rosenbloom (2001) also finds that generally European seniors are moving in the same direction as North American seniors, towards a greater dependence on cars, while other alternatives decline. Rosenbloom and Ståhl (2002) and Rosenbloom (2003) find that American seniors are making longer trips by car than in recent years. In 1995, in the United States, the elderly made over 90 percent of their trips by car and for three-quarters of these trips the elderly were drivers, rather than passengers (NPTS 1995 data, as noted in Waldorf 2003).

Regardless of where American seniors live, they appear to be extremely dependent on private cars, either as a passenger or as a driver. In an American context, Waldorf (2003) finds that in order to meet their mobility needs, the elderly assign "pivotal importance" to cars, regardless of the challenges this may pose due to driving cessation.   According to Rosenbloom (2003), one indicator of the growing importance of private cars is the rate of licensing. In 1997, over 95 per cent of American men and 80 per cent of women over the age of 65 were licensed drivers. By 2030 it is estimated that the gap in license rates between men and women will narrow substantially based on 94 per cent of all women age 45 to 49 are currently drivers' license holders.   Americans over age 65 make about 90 per cent of all of their trips in a car, with 45 per cent as the driver of a single-occupant car and another 43 per cent as a driver or passenger in a car with two or more occupants (Rosenbloom 2003).

According to Rosenbloom (2001), while European countries are far less 'motorized' than the United States, and each country has unique cultures and policies, there are similar trends in terms of seniors holding driver's licenses. In the United Kingdom, in 1985, roughly 70 per cent of men age 65 to 69 held a full driver's license and that this figure had grown to 82 per cent in 1994. About 40 per cent of men over age 85 had a full license in 1994/1996 compared to 21 per cent for

the same age group in 1985. While a large licensing gap between men and women continues to exist in the UK, women age 65 to 69 with a full drivers' license has increased by 81 per cent between 1985 and 1994. Among UK seniors, almost 70 per cent of all trips over one mile (1.6 kilometres) between the ages of 65 and 69 was made in a car (75% of men's and 62% of women's trips). Almost half of all trips made in a private car, by those age 65 to 74, in 1994, in the Netherlands, was by private car. Only 6 per cent of the trips of this age group were by public transit. Among this same age group, a full 43 per cent of trips were by walking (22%) and cycling (23%). Also in 1994, Dutch women age 65 and older made 79 per cent more daily trips by car than this age group did in 1980. By combining rates of holding a drivers' license and having access to a car, during the period 1985 to 1992 Norwegian men between the ages of 64 and 70 grew by 27 per cent while for Norwegian women in the same age group, the figures grew by 83 per cent.

Among seniors in his Boston area research, Coughlin (2001) finds that a common theme is having ready transportation, in the form of a car, means freedom and independence. The participants used the term 'freedom' when discussing the importance of transportation in staying active on a daily basis and used the term 'independence' as the capacity to do or not do something without depending on the kindness or support of others. Automobility can be experienced in very different ways between men and women. Older women have travel patterns substantially different from those of older men, even when they still hold a drivers' license (Rosenbloom 2006). Based on the high prevalence of automobility among seniors and the issues of how to sustain this, Rosenbloom and Ståhl (2002) have turned to community design:

> Surrounding, or perhaps undergirding, all the issues…are questions of how well communities are laid-out and designed – both physically and institutionally – to assist older people to meet their needs and maintain their independence without being totally dependent on the private car. In fact, the "appropriate" design of communities is a complex question – many dense European communities pose a range of problems for some older people seeking non-auto alternatives to mobility. (Rosenbloom and Ståhl 2002, p.209)

Importantly, Rosenbloom and Ståhl (2002) raise the relationship between seniors' needs and how they can maintain their independence in a setting that may give prominence to car use. Rosenbloom and Ståhl (2002, p.209) also outline what they see as the interrelated factors that need to be considered to determine whether a community can meet the mobility needs of seniors as (a) the accessibility as well as the availability of public transport, (b) the accessibility and maintenance of walkways, public buildings and community infrastructure (c) the safety and security of the public environment, (d) the range of public transport options available, (e) the dimensions of the homes in which people are aging, (f) the enforcement of traffic and other safety regulations, (g) the character and atmosphere of public spaces, (h) the home and housing options

available for older people – their design, cost and location, and (i) how a range of public and private services are offered or delivered to older people. What appears to be missing from these interrelated factors is the physical proximity or distance between a seniors' home and their friends, family, services and other elements they may be seeking to connect with. Still, one step further, is to consider if virtual forms of mobility or the delivery of services or, increased emphasis on visits by friends and family, can compensate for a physical distance that is no longer easily overcome.

Recent decades have seen a rapid aging of the population of North American suburbs (Fitzgerald and Logan 1984, Moore et al 1997). Yet, little is known with regards to the environmental context of elderly suburbanization and the ability of seniors to remain independent in these settings (Smith and Sylvestre 2001). At the same time, the aging of large populations living in suburbs is often simply overlooked in discussions about metropolitan decentralization (Rosenbloom 2003):

> Low density development caused by metropolitan decentralization has long been recognized as a major and growing societal problem. What is often overlooked in these discussions is that suburbanization of the elderly parallels the suburbanization of the U.S. population. That so many people aged 30-64 live in suburban areas means that the aging-in-place phenomenon will create suburbs with an even greater percentage of elderly people in the future. (Rosenbloom 2003, p.6)

Callahan (1993) finds that aging in place in suburbs is a less than satisfactory situation for many seniors, by isolating them through a lack of transportation. Rosenbloom (2003) finds that older Americans will both create and face daunting transportation challenges as the majority will live, increasingly alone, in suburban and rural settings that foster a deeper dependence on private cars in order to sustain their mobility. Those who fed the demand for suburban development, and have remained and aged in place, find themselves in an environment often not well suited to their new phase of life. According to Hesse and Scheiner (2007), the action space of older people is defined by the immediate residential environs more strongly than that of a younger person. American architects, town planners and new urbanists Duany, Plater-Zyberk and Speck (2000) aptly summarize the sense of living in a community that no longer meets one's needs and the increased mobility challenges when they write:

> Whether or not the suburbs work as promised for children, they are intended to benefit families, especially young ones. As families age and disperse, however, parents begin to find themselves in an environment that is no longer organized to serve their needs. As driving skills diminish with age, parents become increasingly dependent upon others for mobility, just as their children were once dependent upon them. This situation may represent some form of divine justice, but hardly a satisfying one, since being forced to drive and being forced to ride are equally unpleasant.

Many seniors choose to retire to a house in the suburbs, especially in the Sun Belt – at least, they think that's what they're doing. But they would be mistaken, because, as soon as they lose their driver's licenses, the location of that house puts them out of reach of their physical and social needs. They become in effect nonviable members of society. Unless they are wealthy enough to have a chauffeur, or are willing to burden a relative, they have no choice but to re-retire into a specialized home for the elderly. Then, having left a second community behind, they spend the rest of their days quarantined with their fellow nonviable members of society. The retirement community is really just a way station for the assisted-care facility.

Most elderly are neither infirm nor senile; they are healthy and able citizens who simply can no longer operate two tons of heavy machinery. The phenomenon of suburban auto dependency is not just a theory for those people. It is the reason why we see otherwise reasonable men and women falsifying eye exams and terrorizing their fellow motorists. They know that the minute they lose their license, they will revert from adulthood to infancy and be warehoused in an institution where their only source of freedom is the van that takes them to the mall on Monday and Thursday afternoons. (Duany et al 2000, pp.122-123)

Importantly, Duany and colleagues raise the matter of having to move to a 'specialized home' in order to address their needs when they are no longer able to drive a car. Expressing the sense of discrimination and immobility potentially faced by American seniors, Kay (1997) states:

Autonomy depends on the automobile. And in an aging population, this dependence is no small matter. "I do not like to drive past pretty houses in the lovely New England countryside" writes Paula Boyer Roughny in Maine's *Train Rider*, "with the knowledge that within the walls sits an elderly person of wit and compassion who, due to slight physical frailty, is denied a driver's license. I approve the state's denying her a license; I deplore the national tragedy of drive-fly-or-rot that turns vital human beings into prisoners with no one to talk to and nowhere to go. (Kay 1997, p. 27)

As part of the research for this portion of the theoretical frame, several articles have been considered that explore, to some degree, the mobility experiences of seniors in suburban settings. Three examples are highlighted here. Firstly, is a study that in part compared the mobility of urban and suburban seniors living in Bonn, Germany. Föbker and Grotz (2006) undertook a study of the mobility of seniors in various urban settings within Bonn, where they find that the opportunities for walking and cycling within the outer suburbs of the city are limited due to the long distances between home and facilities. They state that:

In urban developments on the outskirts of the city, everyday life is linked to particular mobility demands. The infrastructure in these partly mono-functional residential areas is often limited…In these areas, the opportunities for the use of slow modes (walking or cycling) are limited due to the long distances between home and facilities. In general, the availability of motorised means of transport

(car, public transit) is a precondition for independent life. (Föbker and Grotz 2006, p.103)

Elderly people who could drive preferred more distant shops, if these shops were considered more attractive. A strong car orientation is also found in that even those who do not have a driver's license or have a car, still use a car for almost a quarter of their daily shopping and that:

A strong car orientation is also highlighted by the fact that even persons who do not have a driving licence or a car nevertheless use a car to do almost a quarter of their daily shopping. These elderly persons are predominantly female and are presumably driven by their partners. Consequently, shopping will become problematic once the partner is no longer able to render this assistance. It therefore seems apparent that it is difficult to manage one's daily life without a car in low-density urban developments. (Föbker and Grotz 2006, p.111)

Secondly, is a study examining the circumstances of urban and suburban seniors in Boston, Massachusetts. According to Coughlin (2001), urban Boston non-drivers appear to have more flexibility and know their transportation options. At the same time, seniors living in suburban Boston have little information as to what resources exist in their communities (Coughlin 2001). One particular suburban senior in Coughlin's research states:

'everything out there is moving. If you're not part of it…it's tough' (Coughlin 2001, p.5)

Another suburban senior describes driving as the:

'thing that gets you out – otherwise you feel trapped' (Coughlin 2001, p.5)

Coughlin (2001) finds that drivers speak about their freedom and independence, while suburban non-drivers express frustration with their transportation options.

Thirdly, is a trans-Atlantic study comparing the mobility of suburban seniors in Quebec, Canada and France. Lord and Luxembourg (2006) undertook research that explored the daily mobility experiences, and its meaning, for seniors living in a suburb of Quebec City, Canada and the periurban suburbs of Marseille, France. Using Kaufmann (2000) as their definition of mobility, Lord and Luxembourg then examined the strategies of adaptation developed by Lawton and Nahemow (1973). Their model has stability observed in time and space through adaptation of both 'mobility lifestyle' and residential situation. Seniors' adaptation is then carried out by a continuous redesign of mobility practices, social relations and residential situation. The Lord and Luxembourg model is enclosed as Figure 3. Lord and Luxembourg do not find age on its own to be a determinant variable as they observed 'young' 'homebody subjects' at age 65 and 'very old' 'regionally mobile subjects' at age 85. Losing one's driving ability means, in almost all cases, the end of a way of life, in terms of various activities and contacts provided through social networks.

In these situations, the French subjects began to look at or consider new housing options, however the Canadian seniors did not. The meaning of losing one's driving ability was somewhat different between the two groups, with Lord and Luxembourg suggesting that the 'cult' of the car is more prevalent among the Canadians, where owning a car is a valued part of an identity. For the French participants' the car is appreciated for the possibility of using it to access otherwise unavailable services. The presence of a bus route close to participants' homes is perceived differently between the two settings. Among French participants public transportation appears to be appreciated by seniors. Among many of the Canadian participants they ignored this option. Lord and Luxembourg (2006) find that there is a gradual reorganization of lifestyle, mobility practices and social representations among suburban seniors. While seniors' everyday lives appear to have a routine, with planned trips to obtain goods, adventure and fortuitous meetings and social encounters, these seem to disappear as mobility practices shrink.

Figure 3 – Lord and Luxembourg Conceptual Framework
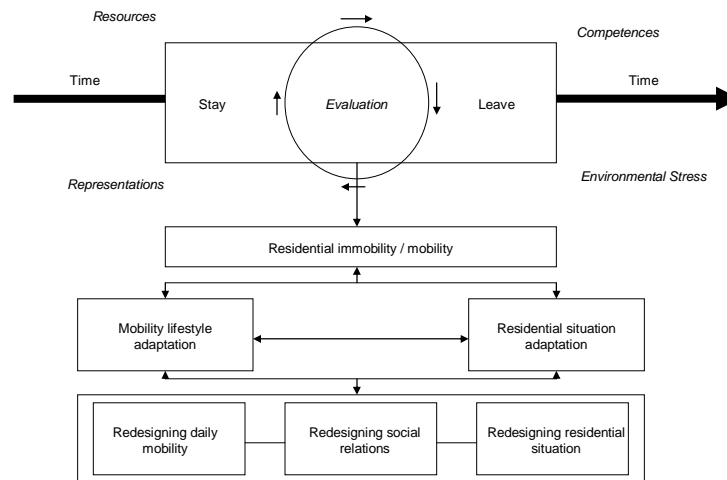
Adapted from Lord and Luxembourg (2006)

Lord and Luxembourg's model helps delineate a possible decision point, possible adaptations of mobility and home and redesigning mobility, social relations and home. What is not included in this model is the needs that mobility may be assisting in achieving connection to, or associated identities and meanings, and their degree of importance in weighing the alternatives considered and the actual decisions made.

2.3.6   Seniors' Driving, Reduction and Cessation

Next we turn our focus generally to seniors and driving, driving reduction and cessation. The OECD (2001) predicts that motor vehicles will remain the principle mode of transport for the next generations of older adults and that their journeys will be longer and more frequent. Freund and Martin (1993, as found in Kellerman 2006, p.81) note that the growing importance of autonomous personal corporeal mobility has loaded the driver's license with some social significance, in that acquiring a license can symbolize the coming of age, and its loss can represent a decline in social standing. Mobility is often perceived as essential to seniors' quality of life and it is usually equated with the car and a driver's license (Johnson 1995). Kostyniuk and Shope (2003) find that the lack of suitable alternative transportation systems and low density land use patterns in the United States have made Americans dependent on cars, with the ability to drive often equated with mobility, and perceived as necessary for maintaining independence, autonomy and self esteem (see also Carp 1988). Living in a setting that has a strong reliance on automobility, and no longer having an ability to hold full citizenship in automobility, can potentially result in a disproportionate level of suffering when compared to those who have lived in a setting without reliance on the use of a car:

> When older drivers lose the ability to drive, or cannot easily secure rides from others, they will suffer substantial losses in mobility. If they have made perhaps irreversible housing and other decisions based on the mobility afforded by the car, they may suffer disproportionately more than those who never drove, given that the latter group may have made household decisions in ways that better support a car-free lifestyle. (Rosenbloom 2003, p.15)

Summarizing their review of earlier research, Rudman et al (2006, p.66) find that a range of negative consequences can follow when seniors stop driving, including loneliness and social isolation, increased demands on others to meet their transportation needs, strained relationships with those who suggested the driving change, depressive symptoms and decreased participation in out of home activities. With such potential negative consequences awaiting and considering the importance of health and quality of life of maintaining mobility as a senior Rudman et al (2006) and Yassuda et al (1997), find it not surprising that senior drivers want to keep driving for a long as possible. A theme identified by Rudman et al (2006) among a group of subjects in their Toronto, Ontario, Canada research includes the practical and symbolic meaning of driving:

Informants described their desire to remain in the driver's seat for as long as possible for practical reasons, as well as because of the symbolic meaning associated with driving. Driving was described as a means to maintain control over and spontaneity in daily life and activities. Informants in all groups viewed driving as an indicator of independence and well-being and stopping driving as an indicator of dependence and decline: "less of a …independent, viable human being that can do your own stuff by yourself" (senior). Losing the ability to drive was linked to becoming "old" – "one more thing about old age" (ex-driver); "[I]t's a sign that you're growing old and you're going downhill" (pre-seniors). (Rudman et al 2006, p. 68)

In this light we can see the everyday and symbolic importance of holding on to the ability to drive a car and have this acknowledged through the holding of a valid driver's license. In countries with highly pervasive automobility the obtaining of a valid driver's license in youth is a rite of passage to adulthood, freedom and independence (McLuhan 1964/1994). Later in life, the everydayness and symbolism of driving can hold meanings of still having youthful capabilities, ability to contribute and independence. Yet the ability to keep driving can be greatly challenged and the forfeiting of a driver's license has the potential to leave someone as an old 'other' who is transformed from being 'independent' and 'contributing to society' to being 'needy' and reliant on others. With this loss someone has the potential to become stratified as immobile (Bauman 1991), devalued (Imrie 2000) and potentially stigmatized (Goffman 1963). As will be probed in greater detail later, the transformation from a mobile to an immobile can also set off changes in the mobility of others in order to address the needs of an immobile that can no longer be easily fulfilled on their own.

A great deal of research has been conducted on very specific aspects of seniors and car driving. For the most part, the research noted below has been undertaken with little or no over-arching theory or model. The research has been undertaken within various disciplines and multi-disciplinary studies, including traffic safety, gerontology, medical and policy. Generally speaking, for our purposes here, this research can be divided into seniors' driving, seniors' reduction of driving and seniors' driving cessation.   This tends to follow the general path a senior presumably follows.

Seniors' Driving

Kostyniuk and Shope (1998 and 2003) find that the present cohort of senior drivers in the United States matured with cars for personal mobility. Due in part to few public transit options providing the same level of mobility, convenience and security that cars provide, seniors are reluctant to use public transit and special paratransit services. Not only is a car a form of transportation, but is also important in maintaining one's independence, autonomy and in some cases, self-esteem.

Seniors continue to be regular drivers. Accounting for no longer making work related trips, younger seniors are active drivers. In a study by Stutts, Wilkins, Reinfurt, Rodgman, Van Heusen-Causey (2001), three-quarters of the drivers interviewed continue to drive daily or almost daily. The frequency of driving decreased with age and was less for females compared to males. In Sweden, between 1990 and 2002, the proportion of those age 80 and older holding a license has increased from 58.3% to 83.6% among men and from 9.6% to 32.5% among women (Hakamies-Blomqvist, Siren, Davidse 2004). Kostyniuk and Shope (2003) find that the private car is by far the preferred model of transportation for older drivers and former drivers in Michigan, U.S.A. They also find that for healthy older drivers, they lead busy active lives that requires a car on an almost daily basis (1998). In 1995, in the United States, seniors made over 90% of their trips by car and over three-quarters of all car trips by the elderly, they were drivers rather than passengers (Waldorf 2003). Older drivers who feel healthy have not changed their driving style from what it was ten years previously (Kostyniuk and Shope 1998). Generally, seniors living in urban core areas rely less on cars than seniors in lower density areas (see Waldorf 2003 for a US example). In the United States, most seniors now live in low-density areas where transit services are limited or non-existent (Rosenbloom 1995, Cobb and Coughlin 1998, Rosenbloom 2003). Nearly 70 per cent of older Americans live where transit either does not provide service or is not adequate. In most places, no mode of transportation can rival the individualized convenience of a car (Taylor and Tripodes 2001).

In the United States, the driving exposure of seniors is at an all time high, with male drivers 65 and older travelling an average of 10,000 miles (16,093 kilometres) per year, which is a 74% increase over the last three decades. By comparison, female seniors drive on average 5,000 miles per year, being a 31% increase over three decades (Johnson 1995). Even though older drivers, as a group, appear to be cautious and relatively safe drivers, they have higher accident rates per mile than middle-aged drivers and rates similar to young drivers (Hakamies-Blomqvist and Wahlström 1998). Those who have a large yearly mileage have fewer crashes per mile than those who have a smaller yearly mileage (Hakamies-Blomqvist, Siren, Davidse 2004). From a Canadian perspective, regardless of living urban or rural, the majority of seniors continue to drive several times a week (Bess 1999). The distances travelled are short and the common reason for the journeys are for shopping, personal appointments such as visiting a physician, visiting family and social get togethers (Bess 1999). Generally, seniors who have a full command and ability to drive, do so within the regulation and licensing standards of the jurisdiction they live in. At some point seniors begin to experience challenges or 'press' that brings them to consider possibly scaling back their driving activities. Regulation and licensing can act as a press that bring some seniors to a point where they may self-regulate and reduce their driving, or go so far as to stop driving completely.

Overall, today's generation of seniors have been driving cars for a considerable period of time and obtained their driver's license at some distant point in the past. Drivers tend to be in a better state of health than former drivers (Siren, Hakamies-Blomqvist, Lindeman 2004). Older drivers have fewer traffic accidents at night and during long driving trips and they tend to drive at prudent speeds and have fewer traffic violations than other age groups (Mori and Mizohata 1995). As a group, seniors have less traffic accidents overall. However, when considered on a per kilometre or mile basis, seniors have a higher proportion of accidents when compared to other age groups (Harrison and Ragland 2003). The skills required to be a safe driver often deteriorate with age and seniors generally seem to be aware of their reduced driving capacity (Zhang et al 2000). Age related social changes are highly relevant to the issue of older drivers. Social changes can have effects on travel behaviour and needs. There can be complex interactive effects, such as the tendency of older women to give up their licenses at a younger age while in good health (Hakamies-Blomqvist, Wahlström 1998, Siren et al 2004) which when combined with the loss of a spouse or narrowing of social networks can have very negative outcomes in terms of well-being and mobility (Hakamies-Blomqvist, Siren, Davidse 2004). The holding of a valid driver's license can be an important form of personal and social identification (Yassuda, Wilson, Mering 1997). Older adults can also derive a sense of identification and independence from driving (Yassuda, Wilson, Mering 1997). Mobility, achieved through driving a car, contributes to maintaining a quality of life among seniors (Waldorf 2003, Stutts and Wilkens 2003). In a Finnish study, Siren, Hakamies-Blomqvist, Lindeman (2004) find that drivers had a higher life satisfaction than former drivers and they displayed a more positive orientation to life than former drivers. Seniors see the retention of a driving capability as a means of retaining a high quality of life (Stutts et al 2001). An England, UK study finds that about a third of those still driving intend to carry on driving until obliged to stop by circumstances which are beyond their control and unforeseeable from their present vantage point (Rabbit et al 1996). Based on their research in Michigan, US, Kostyniuk and Shope (1998/2003) find that the majority of American seniors expect to keep driving as long as they can, even if they have concerns about their driving ability in the near future. From their research of Toronto, Ontario, Canada seniors, asking what they thought of a possible life without a car in the future, Rudman et al (2006) note:

> When discussing what they thought life would be like if they could not drive, senior drivers stressed decreased social contact and unwelcome lifestyle changes: "I live by myself…I don't know what I'd do without the car. I think I'd just give up, go live in a home probably." They thought that making the decision to stop driving would affect their sense of self negatively: "[Y]ou've lost part of yourself when you don't have the mobility when you're used to it."

They also expressed distress in relation to the decision to cease driving: "[I]f I lost the ability [to drive], I think…there's not much left to life." Indeed, a common opinion was that one would attempt to drive for as long as possible: "I will drive until the day I'm physically restrained."

When they were asked to discuss what they thought life would be like if they could not drive, pre-seniors either stressed how not driving would restrict their lives or had difficulty envisioning what it would be like. For example, one pre-senior stated "[Y]our vehicle is your magic carpet ride to getting out there in the world. And without it, you're kind of imprisoned in your own home." Another pre-senior stated, "I can't imagine not driving." (Rudman et al 2006, pp.68-69)

A subject's concern over the possibility of decreased social contact speaks to the potential constriction of social networks, placed in jeopardy by the removal of a car as a means of getting around. A subject considering moving to a 'home' appears to be saying that based on their current home circumstances and location, relative to where one wants to go, no coping strategies seem plausible, and therefore, a change in their home is required, to a setting where immobiles rely on the services of mobiles to address their needs.

Seniors and Driving Reduction

The prevalence of driving declines sharply with increasing age, ranging from 88% of men in their early 70s to 55% of those aged 85 or older (Foley et al 2002). In part, scaling back one's driving appears to be self-regulated. It appears to be related to a change in their personal confidence level, or a change in their physical, cognitive, medical or confidence level. Across various jurisdictions, a range of regulation and licensing standards exist. Licensing and 'fitness to drive' decisions are the responsibility of provinces and territories in Canada and states in the United States of America (Dobbs 2008). There is no comprehensive database of consistently and regularly reported data on US state driver's license policies (Sharp and Johnson 2005). Some of these standards require the retesting of senior drivers. This can include eye tests, medical tests, requiring attendance at focus groups or the possibility of a full driving test in a road environment. Simply facing these various forms of testing, and an associated lack of confidence or apprehension, leads some to decide to cease driving before facing required testing or retesting (Stutts et al 2001). Some US states grant administrators a considerable amount of discretion (Sharp and Johnson 2005), with Florida cited as an example (Cobb and Coughlin 1998). Cobb and Coughlin (1998) find that the most common approach among 45 of 50 states is the limited license, thereby permitting driving under restricted conditions such as only during the day. At license renewal, 40 states re-examine driver's eyes and only four states retest a driver's knowledge of their state's laws. Eleven states require seniors to renew their license at shorter intervals than others and make them subject to some re-examination of qualifications. In 1992 the state of California began reviewing and modifying its method of evaluating dementia among

those holding a drivers' license. This has resulted in a directive that licenses be immediately revoked when there is a clear diagnosis of moderate or advanced dementia or Alzheimer's disease (Dobbs 2008). In addition, California replaced their standard in-person renewal process, including vision and knowledge test and sometimes road test, with an administrative license extension by mail and no changes in the violation or accident rates of seniors was found (Hakamies-Blomqvist and Wahlström 1998). The US state of Pennsylvania is the only state that requires doctors to notify the state when a patient is unfit for driving, regardless of age (Sharp and Johnson 2005). The state of Illinois has long had a driving test at renewal for all drivers age 74 and older (Sharp and Johnson 2005). A more stringent renewal test content is linked with lower crash rates, as is mandatory physician reporting of driving impairments (Sharp and Johnson 2005). Any attempts by US states to place more restrictions exclusively on senior drivers is strongly opposed by the American Association of Retired Persons (AARP) and its state chapters. Their common response is that if retesting is going to be required it should apply to all ages. As a result states have tried and failed to pass stricter licensing requirements. Instead the policy focus has been on alternative ways of enabling people to drive longer safer, such as graduated licensing, use of new intelligent transportation technologies, road signs with large print and insurance breaks for drivers who voluntarily participate in driver refresher courses (Cobb and Coughlin 1998).

Most of Canada's ten provinces have legislation requiring physicians to report patients who may have medical conditions that affect their ability to drive (Molnar et al 2005). In the province of Ontario, drivers must take a medical exam at age 80 and every two years thereafter. At the same time a knowledge test and traffic safety workshops are required at age 80 and every two years thereafter. A road test is required for those age 70 or older who have been involved in a collision where they were deemed to be at fault. A road test may be required after vision and knowledge tests, if considered necessary by a Ministry of Transportation representative, or if there is a recommendation from a physician, police or driver assessment counsellors (Bess 1999). Regarding licensing, in their research of Toronto, seniors Rudman et al (2006) find that:

> While the pre-seniors tended to have little knowledge regarding the existing system of driver regulation, some seniors and ex-drivers acknowledged the potential benefits of written tests and education required by the current system, while others thought it allowed them to renew their licenses too easily. For example, an ex-driver said, "We didn't have a test, we just sat and listened to that fellow…I had that twice and then you went out, singing away." Many expressed concern about on-road tests, pointing to opportunities to abuse the system. One ex-driver shared the following story: "I have a lady friend who was…refused [her driver's licence] at…[specific city], she was refused at some other place, and then she went to… [specific city] and got it. Two weeks later she bumped into a wall at a supermarket. Police came; no more driving." (Rudman et al 2006, pp.70-71)

In many EU countries the renewal of a driver's license is at age 70 (Hakamies-Blomqvist, Siren, Davidse 2004). Hakamies-Blomqvist and Wahlström (1998) are of the view that any screening process will have as a by-product some amount of self screening. Fildes et al (2008) have prepared a summary of licensing practices among some countries. Excerpts of some selected countries are presented here:

Table 2 - Summary of Older Driver Licensing Practices from Selected Countries

Country	Renewal Procedure	Renewal Interval	Medical Requirements for Renewal
Denmark	Yes	License renewed at age 70 At age 70, license renewed every 4 years At age 71, license renewed every 3 years At age 72-79, license renewed every 2 years At age 80, license renewed every year If illness, shorter term possible	Doctor's certificate
Finland	Yes	License renewal at age 70 At age 70, license renewed every 5 years	Medical test required at ages 45, 60 and 70 Medical tests required every 5 years from age 70+
Germany	No	No renewal required	No
Netherlands	Yes	License renewed every 10 years until age 60 At age 60, license renewed every 5 years	At age 70, medical review required every 5 years depending on physical conditions, medical review may be more frequent, vision test required
Sweden	Yes	At age 70, license renewed every 2 years License renewed every 10 years	At age 70
United Kingdom	Yes	License renewed at age 70 At age 70, license renewed every 3 years	After age 70, a medical certificate and vision test required

(Adapted from Fildes et al 2008)

Resources to assist physicians in the decisions related to a driver's ability to carry on driving have been published by the American Medical Association (2010) and the Canadian Medical Association (2006). The skills required for driving deteriorate with age (Zhang et al 2000). Based on miles driven, seniors are the second most dangerous driving group in America, after the age group 16 to 24 (Cobb and Coughlin 1998). Overall, the sensory, physical and mental skills required to operate a car deteriorate with age (Stutts and Wilkins 2003). At the same time, likely due to greater fragility, seniors involved in car crashes are more likely to be fatally injured (Sharp and Johnson 2005). Dobbs (2008) finds that there are subgroups of drivers who are at risk of impaired driving performance, with these impairments being linked to 'functional deficits' due to medical illness or conditions and/or the treatment for these conditions. Older people depend on the ability to drive, not only for its convenience, flexibility, but also for its accessibility to overcome some of the barriers imposed by a declining physical function, which would not be possible through other means such as public transportation (Harrison and Ragland 2003). In an Ontario study, crashes involving drivers age 75 to 79 with medical/physical conditions were five times as likely to be fatal as those involving driving at the same age without medical/physical conditions. Drivers aged 80 and older with medical/physical conditions were 3.5 times as likely to be fatal as those involving drivers at the same age without medical/physical conditions (Zhang et al 2000). Tuokko et al (1995) note that seniors experiencing the early stages of dementia continue to drive, including those who had been in accidents. Persson (1993) finds that only five per cent of senior drivers would stop driving if they were involved in an accident. Lefrancois and D'Amours (1997) find that the risks of driving are proportional to the frequency of daily car use or annual distance driven. Car driving appears to be closely related to personal mobility, but also to safety and security. Compared to other transportation modes, driving is a safe travel mode for seniors when compared to their share of the population and being overrepresented in casualties when using public transportation or being a pedestrian (OECD 2001, Hakamies-Blomqvist, Siren, Davidse 2004).

Vision is the predominant means by which information is acquired from the environment by a driver (Vrkljan and Miller-Polgar 2005). Vision impairments can include loss of peripheral visions, depth perception, figure ground perception and colour (Vrkljan and Miller-Polgar 2005, Maltz and Shinar 1999, Adler et al 2005). Vision is often the most often cited reason for creating driving difficulties (Kostyniuk and Shope 2003, Ragland et al 2004). In order to operate a car one must attend to the overall task of driving, while switching one's visual attention to sources of information within the driving environment, while at the same time it is recognized that as the complexity of the tasks increases, it takes seniors longer to initiate motor responses (Vrkljan and Miller-Polgar 2005, Maltz and Shinar 1999, Tuokko et al 1995). Changes in motor abilities such as a decreased range of motions, can have an affect on aspects of driver performance. This can

take the form of reduced flexibility in one's neck thereby limiting the ability to check over shoulders when changing lanes (Vrkljan and Miller-Polgar 2005, Coughlin and Reimer 2006). Overall, it is difficult to isolate the various factors that are bringing about a decline in driver performance (Vrkljan and Miller-Polgar 2005). Confidence in one's driving capabilities can decline with age. There appears to be a higher degree of possible lack of confidence in one's driving capabilities with age, among women, which can lead to a possible premature reduction in driving or complete cessation of driving (Stutts et al 2001). Concerns about driving in an unfamiliar car, unfamiliar environment, undertaking difficult or complex road maneuvers, crash avoidance, navigation, heavy traffic or driving in bad weather are raised as issues leading to a self regulated reduction in driving (Stutts et al 2001). For all traffic and road conditions, except driving long distance, women report more frequently feelings of moderate or heavy stress (Hakamies-Blomqvist and Wahlström 1998).

While a senior may be faced with growing challenges to driving, in terms of fraying capabilities and skills required to compensate, beyond self-regulating driving patterns, there exists opportunities to compensate via enhanced driver training and utilization of certain technologies. Both forms of coping are investigated here. Goggin and Keller (1996) find that education and training allows seniors to continue to drive safely and thereby retain their independence. In cooperation with 32 of 50 American states that have passed supportive legislation, the American Association of Retired Persons (AARP) has sponsored "55 Alive/Mature Driving Program", allowing seniors to review and brush-up on their driving skills, providing seniors with car insurance discounts if they participate in the program. Noted here is an example of a senior living in the suburbs of New York City, who has participated in AARP training:

> What keeps many older people independent and sane in the suburbs, they say, is driving. "The suburbs has a lot to offer an older person" said Mrs. Millman, of Rye, "if you can get places."
>
> To keep up her skills, and to get a 10 percent discount on her insurance, Mrs. Millman has twice taken a driving course called 55 Alive offered by the American Association of Retired Persons. The instructors offered tips to compensate for the slowing of reflexes that often come with age: don't drive at rush hours, at night or on the highways; leave several car lengths between your car and the next; don't start making a left turn too early and don't start braking too late.
>
> But she said that too few of her friends were as diligent as she. "Some of them shouldn't be driving, but they do," she said. "Their reflexes aren't what they used to be. But they're all terrified of being stuck in their houses. A friend of mine just had to give up her car and she's very depressed." (Fein 1994)

Based on their review of the negative impacts associated with driving cessation, Vrkljan and Miller-Polgar (2005) suggest that there is a growing need to explore measures that enable seniors to continue driving safely for as long as possible, such as modifications to the driving environment. Of the wide range of technologies which can enhance driving comfort and capability, Musselwhite and Haddad (2007, p.19) find that they can generally be grouped into (1) physical, (2) external information, and (3) journey helpers. The 'physical' are technologies that assist, or force, a driver by taking over some part of the physical aspects of driving, such as automatic transmission, cruise control, night vision, or fatigue detection. 'External information', as the name would suggest, utilizes external information and translates it in some way to aid a driver towards a safer situation, such as speed cues or a vehicle detection system. 'Journey helpers' are considered to be the technologies that assist with route planning. The proliferation of technologies within a car, such as navigation, collision warning and other enhancements, have the potential to accommodate some of the age-related losses that impact driver performance among seniors (Vrkljan and Miller-Polgar 2005). Navigation and location systems have been found to enhance the confidence of older drivers to be able to travel in unfamiliar locations. Night vision increases the likelihood that drivers might drive past sun down (Coughlin and Remier 2006). At the same time, American drivers age 50 and older likely have over 30 years of driving experience, making them safe drivers, yet makes their learning and use of new systems a challenge (Coughlin and Reimer 2006). Research suggests that younger and older drivers learn to use new systems differently. As an example, older drivers have been shown to be easily distracted from the driving task at hand when the cause of a warning system is not clearly evident (Coughlin and Reimer 2006).

Relationship with Children and Family Over Concern of Older Driver

Research by Kostyniuk and Shope (1998) includes learning more about the views of grown children regarding their parent's driving abilities. The adult children had attempted a number of different tactics to reduce or stop their parent's driving. Only a few adult children described comfortable conversations with their parents. Adult children who reported that their parents had become defensive, assertive or obnoxious in their response to suggestions that they give up driving, said that they did not expect the degree of negative reaction they experienced. The adult children could not always judge how important the ability to drive and the independence and self-control that driving provides, was to their parents. While older drivers with glaucoma modifiy their driving practices, many report that their family has concerns with their driving (Adler et al 2005). Rudman et al (2006) find that there can be times where there is changing family relationships and dynamics, where the roles between parent and grown children is in flux:

> …there was much ambivalence about these interactions and a concern about resulting shifts in family relationships. One pre-senior, thinking it inappropriate for a child to tell a parent what to do, indicated that this direction of feedback "upsets the balance in the family". A senior stated, "Some family members have had such difficulty taking Dad's car key away…it's just created such heartbreak in the whole family situation." (Rudman et al 2006, p.70)

It appears that seniors who drive recognize their reduced driving capacity and introduce coping strategies to compensate through changes to their driving habits and avoidance of certain situations (Kostyniuk and Shope 1998, Benekohal et al 1994) and that this can typically be a protracted process (Taylor and Tripodes 2001). Kostyniuk and Shope (1998) find that seniors who make adjustments to their driving pattern include driving more slowly overall, driving more cautiously, reducing average freeway driving speed, reducing or eliminating night driving, when possible, reducing night driving in rain, when possible, restricting long-distance travel to daylight hours, take more frequent breaks – splitting a long trip into more than one day with a rest overnight, avoiding rush-hour and streets with considerable traffic and congestion, avoid driving in ice and snow conditions, driving only on familiar and well-lit roads, driving somewhat slower to accommodate slower reaction time and difficulty seeing distances clearly and, needing to rely on mirrors more due to difficulty turning their neck. While self-regulation can help a senior retain their driver's license potentially for some extended period of time, seniors can not always find strategies to enable them to address all of the possible visual, cognitive and motor skills which may be in decline (Bess 1999, Vrkljan and Miller-Polgar 2005). Charlton et al (2006) finds that not all older drivers are capable of self-regulating their behaviour. In part they find that those who do self-regulate tend to be women age 75 and older, with lower overall health ratings and lower confidence in risky driving situations. Men are more likely than women to continue driving regardless of increasing health challenges (Hakamies-Blomqvist, Siren, Davidse 2004).

The relationship between a reduced level of driving and the home environment has not been researched to any great degree, based on the reviews by the author of this research. It may be fair to say that the declines which bring about a reduced level of driving may also cause difficulties in maintaining and moving about a house. One of the key issues raised in focus groups in the Kostyniuk and Shope study (1998) is that a feeling of independence was linked to a strong dislike for depending on others for help. Persson (1993) finds that a driver's license not only means independence and convenient transportation, it also symbolizes autonomy and competence. As one participant in her research noted, "I can barely hear, barely see, and barely walk. Things could be worse though. At least I can still drive." (Persson 1993, p.88) Adler et al (2005) find that the majority of those faced with vision impairment from glaucoma report that driving is important to their quality of life and that driving is not only transportation, but also a key to maintaining independence, autonomy and self-image.

Most seniors do not plan for the possibility that they could outlive their ability to drive (Stutts et al 2001). Faced with a possible future without driving capabilities Yassuda et al (1997) find that seniors express the view that this was not an option due to a lack of feasible alternatives with a typical response being that "driving is not a pleasure, it is a necessity" or "I think in the absence of public transportation, to make it possible to live where we live, I don't think I would give up driving until I was forced...even if I had an accident and knew it was my fault, I think my attitude would be 'well, I am going to be more careful'". For some, not being able to drive is equated with being a 'scary thought' (Coughlin 2001). Most expect their lives to be more difficult and less happy after they stop driving (Burkhardt 2002 as found in Bauer, Rottunda, Adler 2003).

Driving Cessation

In the United States, a comparison of men's and women's driving life expectancies with total life expectancies, find that subsequent to stopping driving, men have about 6 years, and women have 10 years, of dependency on alternative transportation (Foley et al 2002). Men are especially reluctant to stop driving and they will deny any deterioration in their driving skills, in part due to a feeling of responsibility for providing transportation for themselves and family members and a low willingness to accept help from family or friends (Stutts et al 2001). In their research of former drivers in Michigan, Kostyniuk and Shopes (2003) find that none of them made plans or arrangements to address this loss before stopping driving. Women are more likely to stop driving than men and they do so in better health than males. The reasons women give for their driving cessation are less often health related and generally of a less pressing nature than those given by men (Siren, Hakamies-Blomqvist, Lindeman 2004). Hakamies-Blomqvist and Walhström (1998) find that Finnish senior women are more likely than men to give up their driver's license instead of attempting to go through the required license renewal process at age 70. Rimmo and Hakamies-Blomqvist (2002) note that such tendencies may indicate a combined mobility and safety problem for older women as they are more likely than men to be widowed, and since driving is the safest mode of transport for them. In a United Kingdom study, the mean age for driving cessation was 72 years of age (Rabbit et al 1996). According to Hakamies-Blomqvist, Siren and Davidse (2004), in North America, a greater dependency on cars is reflected in the age of driver cessation being higher than elsewhere.

The decision to stop driving is generally made by the seniors themselves (Foley et al 2002). Similarly, Rudman et al (2006, p.70) find that families and professionals do provide input, but seniors tend to make the decisions on their terms. As noted earlier, an added twist to this dialogue and pressure with families is the changing roles between parents and children. For

some seniors a decision to give up their driver's license came about through an accident or a close call, as noted here by Rudman et al (2006):

> …this experience was often framed as the only factor that would lead to the voluntary cessation of driving. A senior indicated that he would stop driving "only if I had an accident or caused an accident", and a pre-senior indicated he would only stop "if I had a really close call". Several ex-drivers shared that their ultimate decision to cease driving was tied to experiencing a "shocking" near accident; for example, "a girl was jay-walking from my blind side and walked in front of my car. Now she was in the wrong, but…that's no excuse for injuring her. So I was able to stop without injuring her and I said, 'Well, driver's test or not [I'm stopping].'" (Rudman et al 2006, p.69)

Knowing what they know now, 78 per cent of the participants in Johnson's (1995) research indicate that given the opportunity, they would not make the same decision to give up their driver's license, even though they were unsafe drivers. One 91 year old in the study summed it up by saying:

> You know, dear, when I gave it up, I'd been behind the wheel for nigh onto 78 years. It was real tough to give up, a real sorrow to me. I know I had to do it because of the troubles I was havin' staying on the street and all, but if I had to do over, I'd never do it. I'd pretend longer. (Johnson 1995, p.134)

Not holding a valid drivers' license appears to make a substantial difference in the number and length of trips made by seniors. In the United States, in 1995, licensed drivers between the ages of 65 and 69 made 87 per cent more trips than the same age group not holding a drivers' license, travelling as passengers. Even at age 85 those with licenses make more than twice as many trips as those not holding a drivers' license (Rosenbloom 2003). Stutts et al (2001) find that when asked for the primary reason seniors had stopped driving, problems with vision (23.5%) and other health problems (13.5%) were mentioned. Overall men and women gave different reasons for stopping driving, with women raising 'comfort' (27% versus 6%), while men were more likely to give a health related reason (77% versus 45%).

Kostyniuk and Shope (1998) find that almost all seniors stopped driving rather quickly, with little or no warning or transition period, and the reasons for stopping were, in order, they had been involved in an accident, illness, moved, changes in confidence or physical condition, declining eyesight, afraid of failing a license renewal test and family pressure. This is similar to findings by Persson (1993) and Kingston et al (1994). There was consensus that information to help them with the driving cessation issue was limited or non-existent. While many families were willing to provide assistance to parents who could no longer drive, a few grown children attempted to ignore the problem due to the impact it would have on their own lives (Kostyniuk and Shope

1998). This is similar to findings of Hakamies-Blomqvist, Siren and Davidse (2004) and Ragland, Satariano and MacLeod (2005). In summary, the decision by seniors to stop driving appears to in part be influenced by the need to drive (physical, psychological, social), the ability to drive (physical, cognitive, psychomotor, economic), confidence in driving, perceptions of risk, family influence and influence of authorities (such as departments of motor vehicles or physicians) (Kostyniuk and Shope 1998). For those seniors who decide to stop driving, the decision is often the end-point of a gradual process during which driving has been limited (Hakamies-Blomqvist and Walhström 1998). In Stutts et al (2001) study of 171 former drivers, looking back, nearly a third (31.7%) felt that they stopped driving too early, yet a follow up question asked if they had made the right decision to stop driving where overall 88.2% said yes. A further follow up question asked if the decision to stop had been made on their own. Three-quarters (74.9%) stated that it had been their own decision. Even in hindsight, former drivers were largely unable to identify steps they could have taken to better prepare themselves for getting along without driving. Yassuda, Wilson and Mering (1997) note that there is little societal support to assist individuals cope with this seemingly negative rite of passage in later life. Taylor and Tripodes (2001) find that compared to households with a licensed driver, households without a licensed driver are three times more likely to report moderate, and twelve times more likely, to report serious transportation problems (Harrison and Ragland 2003). Coughlin (2001) finds that non-driving seniors living in suburbs make fewer trips and pursue fewer activities than those who can drive. Exploring some of the complexities of maintaining connections formerly achieved as a car driver, Rudman et al (2006) note:

> Ex-drivers often reported that they had, indeed, experienced the type of losses envisioned by current drivers. They described how they struggled to maintain their independence and sense of self when having to rely on others to maintain their mobility. One ex-driver described how she had to work around her family's schedule, stating, "I would like to be back [at home] at 10:00…Well, I can't sort of say, well we all have to leave at 10:00. So, I get home when they do…" Ex-drivers described giving up driving as "discouraging", feeling "deprived", having little "freedom of choice", and losing "independence". However, several ex-drivers also indicated that they had learned to adapt to the change over time, often noting they had had to deal with other significant life changes, such as the death of a spouse, almost simultaneously. Some ex-drivers could also see benefits from stopping driving, such as decreased stress and expense. (Rudman et al 2006, p.69)

Public transportation does not appear to be the preferred answer for North American seniors who no longer drive. While some seniors have access to public transportation and appear to be comfortable using it, most feel that it is a poor substitute for driving one's own car (Stutts et al 2001). Seniors who have grown up using public transportation, or who live in a city (such as Seattle in Stutts et al 2001, and Boston in Coughlin 2001) with well developed public

transportation systems, are more inclined to use this alternative. Stutts et al (2001) find that American senior former drivers appear to be very prevalent as passengers in cars, which is identified as the choice of 78.9% of non-driving seniors, with other options such as public transportation, specialized transportation, taxis and walking being less preferred. Similarly, Taylor and Tripodes (2001) find that less than 2% of seniors who no longer hold a driver's license walked, biked, used public transportation or took taxis, compared to 4% while still holding a driver's license. Taylor and Tripodes (2001) also find that senior non-drivers depend on spouses and children to do shopping, although it was not clear whether the former driver participated in the shopping or was brought along due to no home supervision. These same researchers further find that while about a third of seniors are driven to medical appointments prior to losing their driver's license, 92% are driven post losing their driver's license. They further note that senior non-drivers who live in a household with no driver have the greatest difficulties travelling. Kostyniuk and Shope (1998) find that most former drivers say that driving had been very important to them and that it represented freedom, independence and convenience of movement. Within their study they find two types of former drivers – those who had given up driving and knew that they would never be a driver again, and the other group thinking, or at least wishing, that they would regain an ability to drive. Driving cessation represents an intense and personal loss for many seniors (Millar 1999, Adler et al 2005). Marottoli et al (1997) find that driving cessation is followed by a significant increase in depressive symptoms. Marottoli et al (2000) note that a growing body of evidence indicates that out-of-home activity not only affects well-being in seniors, but may also have consequences for physical health status. A higher level of social interconnectedness or social integration has been linked to lower mortality risk. A participant in Persson's (1993, p.90) research notes that "Driving is a way of holding on to your life. I was 94 years old, and it was like losing my hand to give up driving". Persson (1993) notes that this is common among those who had given up driving and why they missed it, with words like independence, convenience and mobility most often cited. Siren, Hakamies-Blomqvist, Lindeman (2004) find that driving cessation is associated with decreased well-being, though it is difficult to determine which one is the cause and which one is the outcome. No longer having an ability to drive in suburban settings appears to have a stronger impact on one's self-image. In Coughlin's (2001) study, one participant states that 'my ego has taken a big hit since not driving' (p.6). In the same group, another senior states 'I don't feel in complete control' (p.6). Coughlin (2001) finds that a perception of reduced freedom is coupled with a perceived shrinkage of participant's world activities. One man's view of no longer being able to drive was that his and his wife's 'world had been reduced to one square mile' (p.6).

Rudman et al (2006) have developed a preliminary model of the process of driving, self-regulation and cessation among seniors (see Figure 4). The model recognizes three important factors; (1) interpersonal factors, (2) intrapersonal factors, and (3) environmental factors. Flowing into these three factors are a variety of elements that weigh into the decisions regarding self-regulation and cessation. Flowing onwards from these three factors is ongoing self-monitoring and self-regulation. An ongoing goal remains retaining a comfort in driving under some circumstances. If a level of comfort cannot be sustained, even after utilizing self-regulating coping strategies, an individual is faced with a decision to cease driving. What is not touched on in this preliminary model is the home and community setting that someone lives in and is attempting to traverse. Seniors living in urban, suburban and rural settings, with different utilized connection characteristics, may weigh factors differently in their decisions and actions towards possible coping strategies found through self-monitoring and self-regulation.

Figure 4 – Preliminary Model of the Process of Driving Self-Regulation and Cessation

Family comments / feedback	Physician comments / feedback	Self-perceived changes in physical, visual and cognitive abilities	Symbolic and practical importance of driving	Environmental hazards	Social portrayal / beliefs regarding aging	Alternative transportation

Medical condition

Interpersonal factors   Intrapersonal Factors   Environmental factors

Regulatory system   Experience of accident / near accident

License revoked

Self-monitoring   Self-regulation

Driving behaviour (frequency, distance, etc.)   Environment (avoid night time, rush hour, certain roads, etc.)

Level of comfort

Reach personally unacceptable level of discomfort – decision to cease driving

Adapted from Rudman et al 2006

Another important element not addressed in the preliminary model is the ability of a spouse, or other family, to be present or not present and have an ability to drive or not drive a car. Somewhat related to this is other family and social networks that could potentially be called upon to assist in retaining a driving ability, perhaps through assisting with navigation or visual queuing. Another important element not addressed in this preliminary model is possible technological enhancements, or new driver training, in order to overcome a challenge to driving. Importantly,

this preliminary model provides an overview of some the factors leading to a decision regarding continuing to drive and possible coping strategies. The model, in its current form, does not focus on the needs that are bringing about desired or actualized mobility. Also, the preliminary model ends with stopping driving. The research at hand is attempting to go further still, to determine what the new mobility and network configurations look like in a post-car driving life.

From this consideration of past scholarly investigations of driving, self-regulation and cessation, we see that the ability to drive a car is an important part of how many seniors see themselves and others. Firstly, the ability to drive is a strong symbol of independence and freedom. Tied very strongly to this can be the sense that 'I still have my wits', or 'nothing wrong with me'. Secondly, one has the ability to come and go as they please and make the necessary connections to sustain their social, economic and service needs. The home environment, no matter its physical location within a settlement or built environment, remains a safe place of refuge, privacy and a symbol of independence and freedom as long as the ability to drive remains in place. With time, a variety of ailments can bring forward challenges to the ability to drive safely under certain circumstances and may result in forms of self-regulation. This self-regulation can alter the traditional mobility patterns. Yet one is still able to hold closely to identifying themselves as a 'driver', and the symbolism of independence and freedom latched on to it, being among a 'community of drivers', and not some 'other' that can't make their way anymore. They may no longer drive at night, on highways or in snowy conditions for example. Patterns are adapted to avoid potential issues as best as possible. Social, economic and service needs can continue to be fulfilled, although not necessarily 'at a whim' as may have been done in the past, due to coping strategies that include self-regulation. The home environment appears, no matter its location within a settlement or built environment, to remain unchanged in most of the past scholarly work. For many seniors it appears that there is little thought of life after the car and if their current home could be sustained without the ability to drive. Driving cessation comes about through one of two typical streams. One is the state through the form of regulations, with their conditions and criteria spelling out required driver capabilities, or the reverse; the triggers that result in a drivers' license being revoked, and their enforcement. The other typical stream is through self-regulation. This could be brought on by some form of a 'close call', a minor accident, family pressure or fear of upcoming state organized test which will challenge their ability to retain their drivers' license.

Other Elements in Attempting to Retain Mobility

With an ability to drive no longer in place, a number of other possible mobility alternatives may continue to be possible, whether in some reconfigured way, if it was already utilized, or have it

newly introduced. The alternatives explored here, drawing on the research of other scholars, are: (a) being a car passenger, (b) scooters, (c) public and private transportation systems, (d) walking, (e) delivered goods and services, and (f) digital life.

Car Passenger

As noted earlier, the car remains a prominent fixture in the life of North American seniors, even after they no longer drive a car. Commenting on research on the mobility of a group of senior women, undertaken by Finlayson and Kaufert (2002), Hodge (2008) notes:

> When they experienced limitations on their mobility such as not being able to drive and/or having to depend on family members and others for rides, they felt they were being a *burden* on others: something they did not wish to be. (italics in original) (Hodge 2008, p.122)

Relying on family and friends to provide car transportation can indeed be a burden, that alters the everyday life mobility and even work arrangements of those providing assistance, demonstrated here in American research by Taylor and Tripodes (2001):

> We find in this research that travel changes in households touched by dementia are similar to those in elderly households with other forms of disability – though the effects of dementia on travel are especially significant. We find that the vast majority of those with dementia depend on family members, both inside and outside the household, to serve as chauffeurs following license revocation. Dependence on family members for care (including chauffeuring) is so great that principal care givers frequently quit or retire from work. We find further that households with no other licensed drivers report the most transportation and access problems, especially among younger households with greater expectations for travel. Finally, we observe no increase in the use of alternatives to private vehicles – fixed-route public transit, flexible paratransit services, taxis, or walking – following license revocation, even in households reporting a dearth of licensed drivers for chauffeuring. (Taylor and Tripodes 2001, p.520)

Here we see how the life of relatively immobile seniors can impact and alter the lives of those who are mobile. This will be an important element in our later consideration of mobile arrangements with others.

Scooters

There is a growing, substantially anecdotal information base related to the growing use of alternative private forms of vehicles by the elderly, including small electric vehicles and motorized scooters and golf carts (Rosenbloom 2003). These vehicles are often faced with varying regulatory constraints in different jurisdictions. Once a golf cart has a speed capability above 20

or 25 miles per hour, it is considered a low-speed vehicle (LSV) by the (US) National Highway Traffic Safety Administration and becomes subject to minor safety regulations from which a low speed golf cart is exempt (McGwin et al 2008). In the United States, golf cart use is primarily controlled at the state level and the regulations vary greatly. For example, in the state of Alabama, it is illegal for any 'nontaggable vehicle' such as a golf cart to be operated on public roads (McGwin et al 2008). In the state of Florida a modified golf cart (low speed vehicle) with a top speed of 20 to 25 miles per hour can use roads marked with a speed limit of 35 miles per hour or less (Seluga and Ojalvo 2006). The statute that regulates this allows municipalities or counties to disallow this privilege if it is determined that a prohibition is necessary in the interest of safety. Currently 17 states allow low speed vehicles to operate on public roads with a speed limit of 35 miles per hour or less and one state, Kansas, allows low speed vehicles on roads with a speed limit up to 40 miles per hour. Six states prohibit the operation of low speed vehicles on roads and 27 other states do not have any laws that specifically address low speed vehicles, however the current laws allow for their use (McGwin et al 2008). As a specific community example, in 2001 Colonial Beach, Virginia was petitioned to allow golf carts on town roads where the closest golf course is about 20 kilometres away. The carts cannot travel faster than 25 miles per hour and must be equipped with lap belts, headlights, turn signals, a horn and other safety equipment. There are an estimated 400 carts now on town roads (Patriquin 2007). An example of one resident of Colonial Beach who uses a cart, and some of the constraints related to where it can be used, is presented here:

> But few embody the yin and yang of golf cart ownership better than Colonial Beach resident Gladys Nunnally. With a pacemaker and recent knee surgery, the 65-year old real estate agent would be marooned without her cart. Naturally, though, she didn't settle for the plain-Jane model: hers is outfitted to look like a 1932 Ford Roadster coupe; complete with Chianti red paint job, mahogany steering wheel and antique oogah horn. ("That's the noise it makes, oogah," she says.)
>
> "I've had people flag me down to come see it", she says. The only downside is that she can't get from the Food Lion grocery store to the pharmacy yet, because the pharmacy is on a road where the speed limit is too high. So Nunnally usually stays along the beach, sometimes with clients, sometimes with Hans, her 17-year-old short-haired dachshund, who loves the ride almost as much as she does. (Patriquin 2007, p.62)

In Australia scooters are often utilized as an alternative to cars rather than as an enhanced pedestrian device. In most Australian states and territories there is no licensing requirement for scooters. Understanding the importance of seniors' mobility, an Australia scooter company was advertising specifically to seniors who no longer held a driver's license. Their messaging included "I was upset when they took my car license away …"unnamed scooter company" put me back on the road to independence" (Berndt 2002).

Public and Private Transportation Systems

Public and private transportation systems are an option to car driving, yet their ability to address the unique needs and challenges of seniors, and in particular, seniors living in communities designed around automobility, is uncertain at best. Urry (2005, p.29), notes that public transport rarely provides for a seamlessness that a car journey makes and that there are 'structural holes' in semi-public spaces which are a source of inconvenience, danger and uncertainty, especially for children, women and older adults. Hess (2009) finds that walking distance is a significant influence on transit use by seniors in San José, California, but not in Buffalo, New York, and that seniors who drive cars are more sensitive to the walking distance to public transit than for non-drivers. In a Swedish study of seniors with cognitive functional limitations, the possible use of public transit was seen as a challenging activity or out of the question (Rosenkvist et al 2009). In his research of seniors in the United States, Burkhardt (2000) notes:

> While many of the focus group participants said they would use public transit if it were available, more convenient, and more reliable, we found that few older persons who lived in areas with public transit actually did use it or had ever used it. A few participants, on the other hand, had moved (changed homes) to be nearer to public transportation. (Burkhardt 2000, p.109)

In their research of seniors in western New York and northern Florida, Hendrickson and Mann (2005) find that if there is some form of available personal transportation, seniors are less inclined to access public transit. Coughlin (2001) finds that among Boston area seniors there are a number of issues presented by participants that made using public transit not their preferred option. Concerns such as personal security, accessibility, being 'jostled' around on a bus and difficulty getting in and out of a bus were raised. One participant notes that she has difficulty using public transportation as it is difficult to carry all of her 'bundles'. The same research finds that taxis are considered a realistic alternative for doctor's appointments involving procedures that might hinder driving. The door-to-door aspect was seen as an attractive feature, but at the same time there was skepticism about the cost of using a taxi. Urban non-drivers in Coughlin's (2001) research cite the existence of 'gypsy cabs', non-licensed privately owned cars for hire, which serve the transportation needs of seniors in some areas of Boston.

Walking

With age, walking can be hindered. There can be situations among seniors where they may no longer be able to walk well, but still hold on to an ability to drive. Bannister and Bowling (2004) find that the majority of the participants in their research did not have problems walking 400 yards

(366 m). Looking at Galway, Ireland, Leyden (2003) finds that those living in walkable mixed-use neighbourhoods are more likely to know their neighbours, participate politically, trust others and be socially involved. Leyden further notes that many Americans have no choice but to live in modern, car dependent suburbs. Chang et al (2004) find that 21 of 62 (34%) of senior subjects in their research, who could walk 400 metres at their baseline analysis, were unable to complete the walk in the follow-up 21 months later. More than half of those who took more than 7 minutes to walk the 400 metre distance at the baseline analysis, failed to complete the test at the follow-up. For those who developed a 'mobility disability' at the follow-up, the main reason given for stopping walking was fatigue (71%). Two-thirds of those who reported fatigue reported secondary symptoms such as leg pain, dry mouth, dizziness, unsteadiness, back pain and shortness of breath. It is estimated that 20 per cent of Danish men age 67 to 79 years of age and 39 per cent of men age 80 and older are not able to walk 400 metres without difficulty. Among women age 67 to 79 the estimate is 25 per cent and 58 per cent of women age 80 and older cannot walk 400 metres without difficulty (Brandt et al 2004).

Delivered Goods and Services

One possible means of overcoming no longer having an ability to drive a car, in order to make necessary connections, is to have goods and services delivered. One rare example of this being investigated among seniors is Taylor and Tripodes (2001) who find that a minority of households use delivery services for food, laundry or other essentials.

Digital Life

Yet another, and possibly related means of overcoming no longer having the ability to drive a car, in order to make necessary connections, is to make these connections in a digital form. Baym (2010, p.153) argues that digital connections are changing the ways humans relate to one another in complex ways. On-line shopping has experienced high rates of growth in recent years, yet, little is known in terms of its impact or relationship to travel behaviour (Farag, Dijst, Lanzendorf 2003), or seniors' attitudes to, and use of Internet (Iyer and Eastman 2006). Very little research appears to exist, in terms of seniors using online shopping services that deliver goods and services to them, rather than them having to physically travel to a location to go shopping. In their research of seniors shopping in upstate New York, Curch and Thomas (2006) find that one out of the 20 participants mentioned using online shopping.

2.3.7 Social Networks

Phillips et al (2000) note that social networks have an extensive pedigree in the social sciences, with early examples appearing in the 1950s. Research within the social sciences has demonstrated the multi-dimensionality of social networks (Glass et al, 1997). Phillips et al (2000) further note that the study of networks has been extensive and has varied from locality-based studies, such as Wellman 1979, to the networks of parents and children and older adults. Urry states that mobility is central to gluing social networks together (Urry 2002, p.265). From a gerontology and life course perspective, Antonucci and Ajrouch (2007) define social networks as:

> …a structure of individuals with designated relationships to the focal person. Social networks vary in terms of the number of network members, frequency of contact, geographic proximity, and composition. Networks represent an available resource, a source of help in times of trouble, comfort in times of pain, and information in times of need. At the same time, as Granovetter (1973) noted, sometimes there is strength in weak ties. Thus, having a multifaceted, diffuse, large network may be considerably more helpful in solving a problem than one which is dense, family-based, and small. (Antonucci and Ajrouch 2007, p.51)

Having others close by providing assistance may subdue or delay the need for technological devices, or other coping strategies, whereas the demands of living alone may increase the need for technological devices to help overcome physical mobility restrictions (Zimmer and Chappell 1994). Existing literature, examining the social networks of seniors is limited (Glass et al 1997). Based on their study of formal and informal social networks associated with elder self-neglect, Burnett et al (2006) find that there is strong evidence of an association between decreased social resources, particularly related to informal social networks, and self-neglect. From the perspective of working relatives providing care to an elder, distance measured in time, has an effect on the amount and frequency of assistance provided (Joseph and Hallman 1998). In a study of the social networks of seniors living in Groningen, Netherlands, Moorer and Suurmeijer (2001) find that the neighbourhood seniors live in has a relatively small influence on loneliness and the size of a social network. Wenger (1997) identifies a number of different network types along with their circumstances and practices (see Table 3).

Table 3 - Wenger's Network Types

Network Type	Likely Circumstances	Significance for Practice
Locally Integrated	Terminal illness and associated pain Severe loss of mobility; family, neighbour stress	• Help for elderly person in accepting residential care, loss of independence • Involvement of elderly person in decision-making
Wider Community Focused	Severe loss of mobility, pain Loneliness associated with loss of friendships	• Help with recognition/acceptance of dependency, loss of independence • Private home may be preferred
Local – Self-contained	Severe loss of mobility, pain Isolation/loneliness Depression	• Help adjusting to idea of group living • Small homes may be preferred
Local – family-dependent	Stroke or other debilitating chronic illness with heavy nursing demands	• Carers likely to need support in decision making and after • Carers may need counseling to deal with feelings of guilt or failure • Mediation between carer and elderly person or family may be needed
Private restricted	Severe loss of mobility, pain Lack of social contacts Isolation Depression	• Help with recognition/acceptance of dependency • All alternatives to residential care should be explored • Small homes better tolerated

(adapted from Wenger 1997)

According to Wenger, the Locally Integrated network is the most robust, with the membership made up of family, neighbours and relatives who live within close proximity (1 mile or 1.6km). This network typically consists of 7 or more people. Wenger finds that this network type is associated with high morale and low levels of isolation, loneliness and depression. The Wider Community Focused network is less frequent type of network that is typically has an absence of local family. This network type has a friend and volunteer focus although contact with family is typical. The membership of this network consists mostly of friends living within 5 miles (8km) with some family and neighbours more than 50 miles (80km) away and with a total network size of about 8 or more people. Wenger (1997) notes that:

> Because of the high value placed on independence, needs may be minimized and paid services preferred to informal help. In emergencies, distant family are likely to come for short periods of time, but often cannot stay for long. As a result, old people may be discharged from hospital to the community without a care package on the assumption that family care is available and left with inadequate support when the relative leaves. (Wenger 1997, p.314)

Wenger also notes that loneliness can occur with increasing frailty, loss of mobility, loss of friends and reduced social participation. The Local Self-Contained Support network, for the most part, consists of neighbours and supplemented by family living more than 5 miles (8km) away. Wenger (1997) states that this network type "…reflects a household-focused privatized life style"

(p.314) with any community participation being low key and infrequent. Seniors with this network type tend to opt out of any forms of reciprocal exchange and resist help unless absolutely necessary. The Local Family Dependent Support network exists where a senior has lived in one general area for a significant period of time and there is local family in close proximity. The members of this network are mostly local family but some neighbours may also be included. Wenger (1997) notes that "It is usually associated with residence very near to or with an adult child, most often a daughter. All needs are typically met by the immediate family and extra-family involvement is low." (p.314) Wenger provides us with a way of seeing different network configurations and to some degree, that they can be reconfigured as circumstances change or require. Not touched on here are the technologies and associated skills integral to building and sustaining various network configurations.

2.3.8   Home – Should I Stay or Should I Go?

Moving to a new home where driving is less essential is one possible way of addressing seniors' changing circumstances. In their focus groups with rural seniors in Michigan, USA, Kostyniuk and Shope (1998) find that some respondents move to senior-citizen complexes because of the short drive or walk to nearby shopping. In her 1993 research all of Persson's participants had moved to retirement communities and for some the move was to address mobility issues. In a study of 20 upstate New York seniors shopping habits, one participant lived in a retirement community where they use the community's van service to get to stores (Curch and Thomas 2006). Of the remainder of the study group, 15 drive their own cars and three use a public bus system and express some challenges with the bus schedule (Curch and Thomas 2006). Researching Swedish seniors who had moved to a retirement home, Fonad et al (2006) find that the most common reason participants moved into a home was due to feelings of safety and security due to accidents, such as falls, that had occurred while living in their previous homes. Due to physical limitations they were no longer able to perform 'everyday activities' they had once enjoyed and the design and furniture in their former home were a safety risk. Doorsteps and other obstacles caused some to fall and thick carpets were a challenge for those in wheelchairs. The participants felt that they had good social relationships with other residents in their new home. What is not clear is if this is in contrast, or similar to, the circumstance in their former home, with their reduced mobility. In their former homes, even with visiting home-help assistance there were concerns as the help was only a few hours a day and what if they fell and were alone. From their study of suburban seniors in France and Canada, Lord and Luxembourg (2006) find that seniors face social pressures, such as independence, coming from many sources, which may influence them to try to stay in their current homes and that their existing neighbourhood is known, secure and a distinctive place. Caouette (2005) describes home as:

> "Home" allows one to control his or her environment and assures a sense of security. It offers freedom of action and expresses its resident's ideas and personal values. The experience of home establishes a state of permanence and continuity, which provides a sense of belonging. Home permits us to develop and secure our relationships with family and friends. Home is the center of daily activities; a refuge, a restful and calm sanctuary where one retires far from the daily pressures of the outside world. Home is an indicator of social status. Finally, owning one's own dwelling strengthens a sense of positive relationship to the home. (Caouette 2005, p.254)

Caouette (2005) has developed a theoretical approach on the meaning of home for the elderly, with a particular focus on seniors relocating. The approach begins with three interrelated themes, these being (1) users, (2) built environment, and (3) society. This approach does not tackle head on many of the social aspects of home as a place of interaction (for example, family or friends coming to visit), or home as a base for outings of any sort. In short, this framework does not go far enough, for our purposes. To go still further, home can be seen as a wave permeated from every direction by streams of energy running in and out (Lefebvre 1991). Indirectly the approach may be addressing these comings and goings through 'needs' noted under the user theme, yet for our purposes it can be brought more into focus. As we move along in this theoretical frame we will see that home can be a base from which mobilities proceed and return, in an effort to connect with needs, and can also be seen as a location where others use their mobility to bring needs towards someone who is relatively immobile in their home.

Joseph and Fuller (1988) see home as strongly interrelated to the need for services and transportation. Based on previous research and an attempt to illustrate how home, services and transportation are all elements that can change as someone ages, they developed a matrix of housing setting, associated service support and transportation characteristics, presented here as Table 4. As an extension of this matrix Joseph and Fuller present a figure (included here as Figure 5) which delineates decision points that seniors may face as their capabilities change and their needs increase and how an adaptation can be achieved by possibly moving to a new setting or placing more demands upon the available support networks. The figure clearly shows that a single adaptation, or implemented coping strategy, may be a step towards further adaptations as capabilities continue to decline and needs continue to rise.

Table 4 - Housing Setting and Associated Service Support and Transportation Characteristics

	Housing Setting	Service Support Characteristics	Transportation Characteristics
Old Elderly	'Restrictive', catering to the dependent elderly	Personal care and health care services on site. Some need for facility-based acute care services.	Limited and specific transportation needs.
Middle Elderly	'Moderately restrictive', catering to semi-dependent elderly	Limited mix of formal/informal support services on site. May be extensive demand for delivered 'community care' services. Some use of facility-based health, social and cultural services.	Increasing incidence of transport-dependence accompanied by decline in physical mobility.
Young Elderly	'Least restrictive', catering to the independent elderly	No formal support services on site. Limited demand for delivered, 'community care' services but extensive use of some facility-based health, social and cultural services.	Transport not an issue for most elderly. Transport-dependence within some elderly households.

(Adapted from Joseph and Fuller 1988)

Figure 5 – Residential Choice and Supportive Services for the Elderly
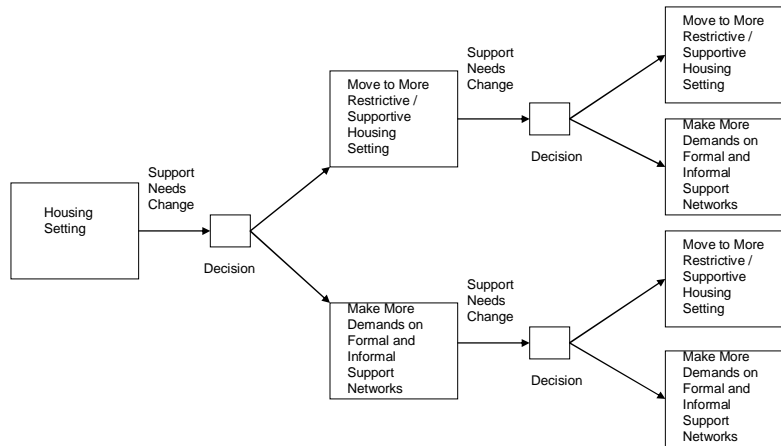
Adapted From Joseph and Fuller 1988

Mahood and Martin-Matthews (2008) highlight the interactions and linkages between home, people and environments and how these change with time when they state that:

> The meaning of home is generated through interaction between people and the home environment in the context of their life experiences. At the most general level, it links people to their environments. For older adults, *meanings of home* include home as a representation of self-identity, independence, and safe haven, and home as a place of choice regarding lifestyle and activities … At the most basic level, homes provide shelter to people. Psychological, cultural, and social meanings are embedded in the home environment. Oswald and Wahl (2005) stated that different aspects of *meaning of home* are emphasized throughout people's lives. This is especially true for older adults. The home is simultaneously a comforting and familiar place and a burdensome and anxiety-producing place that is often unsafe, hard to maintain, and not barrier-free for people with mobility challenges. (Mahood and Martin-Matthews 2008, p. 27) (italics in original)

Here we see the strong emotional attachment one may have for one's traditional home while at the same time experiencing anxieties and frustrations with mobility which may ultimately lead to grappling with coping strategies that could include changing home, thereby potentially uprooting existing networks and moving elsewhere in an attempt to overcome mobility challenges. Similarly, Chaudhury and Rowles (2005) find that the meaning of home reflects upon the past and can be jeopardized by changing life circumstances:

> Homes serve as referents for past life experience. They remind us, both as individuals and groups, of our past. This continuous reminding feeds into the enduring nature of our selves, preserves self-identity, and provides the critical thread for continuity into the future. The process is signified by the "Me" aspect of the self being nourished, validated, and strengthened. The other aspect of home experience relates to the evolving nature of the self. In addition to being sustained, aspects of the self may discontinue as a result of changes in life circumstances, e.g., moving into a care facility symbolizes loss of home for an elder. (Chaudhury and Rowles 2005, pp.13-14)

Based in part on his Danish research, seeing how the meaning of home changes with withdrawal from formal paid work and how home is wrapped in with identity, Leeson (2006) finds:

> *My home is my castle*, so goes the saying, but today an individual's home is more than his/her castle, a place to live and provide shelter. An individual's home is now a defining part of his/her identity and lifestyle. It is where we relax, are entertained, share our experiences with family and friends, perhaps increasingly so later in life after withdrawal from the labour force means the workplace no longer provides us with this public sphere of activity. (Leeson 2006, p.64) (italics in original)

Leeson's thoughts on entertainment and shared experiences with family and friends demonstrates mobilites moving towards a senior more and more, versus a senior going out to be entertained and spending time with family and friends. Faced with challenges of various sorts, many seniors plan to stay in their homes. Research undertaken by Mathew Greenwald & Associates, on behalf of the American Association of Retired Persons (2003) finds that 83 per cent of Americans age 45 and older say they strongly or somewhat agree that they want to remain in their current residences for as long as possible. Even if some form of care or assistance is required, 82 per cent say they want to stay in their own homes. In part this study finds that:

> While Americans have given some thought to the living situation they would *like* to have as they age, many have not taken into account the potential deterioration of health and physical ability that may occur in the later years of life. The lack of forethought does not appear to be intentional; many consumers simply seem to be in denial regarding the possibility of increasing frailty, exhibiting what may be - an unrealistic sense of optimism about the future. (AARP, p.3) (italics in original)

An overwhelming majority of older Germans prefer to live independently in their own homes (Föbker and Grotz 2006). Reporting on a Danish longitudinal study, Leeson (2006) finds that over three waves of data, there has been a significant increase (from 41 per cent to 81 per cent among the oldest group, age 75 to 79) in participants stating that they want to remain in their present housing. Leeson (2006) further notes that the drive to stay put in their current housing in old age is reduced if one becomes dependent on help and support from others. Even when faced with increasing dependency on the support of others, staying put remains the expectation of 40 per cent of the two oldest generations, while 23 per cent (age 65 to 69) and 38 per cent (age 75 to 79) would want to move into specialized seniors' housing. None of the participants wished to move in with family, but the proportion wishing to live near family and friends increased significantly with age. Looking at the residential preferences of 776 people age 55 and older in the American Northwest, Wagnild (2001) asked respondents to rate the benefits of remaining in their own home as they age, with the main reasons given being: (1) feelings of independence and control (61.1%), (2) feelings of safety and security (44.5%), (3) being near family (43.7%), and (4) familiarity with their surroundings (39.4%). Seniors most certainly have housing options. Oswald and Wahl (2004) argue that empirical research on the relationship between housing and health in later life is sparse. Culture can play a role in the housing choices of seniors. In a study of 2,272 Chinese-Canadian seniors, a full 48.9 per cent indicate that they prefer to live with their children. The longer a Chinese-Canadian resides in Canada, the less they prefer living with their children (Lai 2005). In a study of very old seniors in Sweden, Germany and Latvia, Iwarsson et al (2006) find that there are four common environmental barriers between seniors and their homes. Three

of the four are outdoor in nature, these being (1) paths and uneven surfaces, (2) high curbs and (3) none or little sitting areas. The fourth barrier is wall-mounted cupboards in kitchens.

Deciding to move, and the possible reasons to move, appears to be a complex situation for seniors. Morrow-Jones and Kim (2009) find that research of young seniors' residential relocation decisions has received little attention to date. At first glance one might think that all moves by seniors are tied to immobility or a need for care. Contrary to this, there are some who leave traditional homes and live mobile. Savishinsky (2001) describes the example of a retired upstate New York couple, Bruce and Nikka Palanos, who began their retirement by selling their home and purchasing a large recreational vehicle and renting an apartment. Two years later the Palanoses gave up their apartment and rented a summer campsite near their former home as a summer base between winters spent in the southern sunbelt (for a more fulsome discussion on RVing seniors and RV communities, consider Counts and Counts 2001 and Patterson 2006).

2.3.9   Planning for Aging Populations

Populations across the West are aging. Earlier it was noted that some of the more rapidly aging communities are the United States, Canada, Australia and New Zealand. People are living longer and birth rates are declining, contributing to creating aging societies, thereby altering the nature of how nations and communities consider themselves and policy priorities and strategies for the future. For example, is the changing nature of the capabilities and needs of a population considered in new or revised initiatives? Are societies adequately preparing, planning, and adjusting to the ongoing aging of their populations? From an American perspective Dychtwald (1999) argues:

> Just as society's institutions have been grossly underprepared for the baby
> boom, the teen boom, and a yuppie boom, we have as yet done far too little to
> prepare for the coming elder boom. (Dychtwald 1999, p.77)

As discussed earlier, many communities have been built addressing the needs of young families, having met their needs when they moved to these areas. Over the decades many have stayed and aged in place, with their capabilities and needs changing. From a Canadian perspective Hodge (Autumn 2008) states:

> It is no doubt well known to Canadian planners that the country's population is
> getting older, that those aged 65 and older comprise larger numbers and
> proportions among us, and that this trend will continue for several more decades.
> However, much less has been said about what this means to the communities
> and regions in which population aging is actually experienced and where
> planners will have to respond to it. (Hodge Autumn 2008, p.22)

Explaining why planning for aging populations at a community level is often left untouched, Hodge (2008) states:

> As urgent as the demographic data seem, they do not have the insistence (or visibility) that other community problems have. There is no rush of new subdivisions, or traffic gridlock, or marshes to protect confronting community planners. Population aging occurs one person at a time in individual dwellings across the community. Increases in requests for accessible transportation or for supportive housing accumulate gradually, and usually seem unrelated. (Hodge 2008, p.243)

According to Rosenbloom (2003) one way to plan for mobility in a time of aging demographics is through a more integrated relationship between transportation and land use planning:

> Many efforts to integrate transportation and land-use planning are designed to mix land uses, promote infill and central city redevelopment, and increase densities, all of which could increase the mobility and access of the elderly. Such development can locate a range of social and shopping opportunities nearer to home, reducing the elderly's need to travel far or by car. Multi-use developments that include housing might allow older people to conduct their daily activities largely within their own apartment building or complex. If such developments occur near their suburban homes, the elderly may be able to move from houses now too large into appropriate apartments, remaining in their own neighbourhood as they age. (Rosenbloom 2003, p.13)

The World Health Organization (WHO) has developed a guide for global age-friendly cities, using research from 33 cities, which highlights some of the transportation, community participation and driving challenges faced by seniors (WHO 2007). In outlining the purpose of the guide the WHO states:

> WHO regards active ageing as a life-long process shaped by several factors that, alone and acting together, favour health, participation and security in older adult life. Informed by WHO's approach to active ageing, the purpose of the Guide is to engage cities to become more age-friendly so as to tap the potential that older people represent for humanity.
>
> An age-friendly city encourages active ageing by optimizing opportunities for health, participation and security in order to enhance quality of life as people age. (WHO 2007, p.1)

Elsewhere, the guide expresses the options of planning for aging over planning for the mythical average person:

> The city's landscape, building, transportation system and housing contribute to confident mobility, health behaviour, social participation and self-determination or, conversely, to fearful isolation, inactivity and social exclusion…design for diversity is the key to supporting optimal capacity among high-functioning individuals and enabling older people to function who would otherwise become dependent. According to the project participants, it should be normal in an age-friendly city for the natural and built environment to anticipate users with different capacities instead of designing for the mythical "average" (i.e. young) person. (WHO 2007, p.72)

More specifically, the guide describes eight age-friendly city topic areas, these being, outdoor spaces, transportation, housing, social participation, respect and social inclusion, civic participation and employment, communication and information and, community support and health services.

2.3.10 Summary

This concludes the seniors and mobility section of the theoretical frame. This section has provided an opportunity to consider research by other scholars, outside of the mobilities turn. In a general sense, we can see a host of research from a variety of disciplines, probing aspects related to seniors' mobility. We can consider this portion of the theoretical frame as the lower level, or underpinning, of the foundation for the research presented in this thesis.

Through the development of this seniors and mobility portion of the theoretical frame we have considered various aspects, including seniors driving cars, possible reductions in driving and driving cessation. Table 5 provides a summary, which also assists us in bridging over to our discussion of mobility in the human-built socio-technical world and the mobilities turn.

Table 5 – Seniors and Driving - Summary

Driving Status	Driving	Driving Reduction	Driving Cessation
Physical / Cognitive / Medical / Safety / Confidence Challenges to Driving	Any challenges are at a level that do not greatly impact driving ability	Challenge can be addressed through self regulation (modify driving patterns, times etc.)	Challenges reach a point where authorities revoke license or individual stops driving of their own choosing
Regulation and Licensing	Valid driver's license	Self regulation to address changing circumstances (such as overall ability and comfort level)	No driver's license License could be revoked by a government authority or medical professional, or, Self-regulated license non-renewal, with possible influence from family, government or medical professional
Attempts to Retain / Extend Driving Ability	Not applicable	Training / driver refresher courses Car and driver assistive technology Self Regulation	Utilize an electric scooter or similar device that does not require a driver's license
Driving Environment of Drivers	Driver is able to navigate/pilot the driving environment	Driver is no longer able to navigate/pilot all driving environments (may no longer drive at night, on highways, in bad weather etc.)	No longer a driver May remain a car passenger
Home Environment	Safe refuge, privacy, independence No change Status quo	Typically no change to home location – there may be home adaptations to address mobility / accessibility within the home environment Possibly move home location and establish new mobility patterns and networks (aware of only two American studies that have explored this)	Attempt to find means to address diminished personal mobility – possible scenarios could include physical travel with friends and family (possibly impacting/altering their mobilities), service delivery (public and/or private) to one's home (possibly impacting/altering service agency mobilities), friends visiting individual instead of individual visiting friends (possibly impacting/altering the mobility of friends), increased use of virtual mobility, increased public and/or private transportation systems, utilizing an alternative personal transportation device such as an electric scooter, and moving to a new location and establish new mobility patterns and networks
Family and Friends	A relationship which does not involve a strong role in terms of mobility assistance	Times of visits may change/be limited Perhaps less 'physical' and more 'virtual' connections	May be a need for family to assist with mobility, thereby impacting their own mobility
Need for Mobility	Strong and Fulfilled	Frustrated but accomplished through coping strategies	Frustrated
Motility	Strong	Diminished	Diminished or greatly diminished (depends on access to alternatives and characteristics of the built environment)
Understanding of Themselves as Social Individuals, Sense of Freedom, Independence and Quality of Life	Strong	Diminished	Greatly diminished at the time of driving cessation An exploration of the new understanding of themselves, sense of freedom, independence and quality of life forms a part of this research and is explored in more detail later in this thesis
Altered Mobilities and Networks	No change Status quo	Possibly self-imposed modification of mobility patterns and networks Typically do not foresee a time without driving ability and plan to stay in their traditional home	Likely an abrupt halt to traditional mobility patterns and networks, or greatly diminished An exploration of the new altered mobility patterns and networks forms a part of this research and is explored in more detail later in this thesis Depends in part on access to alternatives and characteristics of the built environment

2.4   Mobility in the Human-Built Sociotechnical World

2.4.1   Introduction

Having concluded the lower level of the foundation of the theoretical frame for this research project, next is where we present what can be considered as the upper level of the foundation, that builds on the previous research and creates a human-built socio-technical world and mobilities turn context for the consideration of seniors' mobility. After these introductory remarks, where we position this research within a human-built sociotechnical world context, next is a discussion of the mobilities turn, with a particular focus on aspects that are worthy of consideration when considering those who may be experiencing challenges to their mobility, based on elements brought forth in the lower level of our foundation. The second part of this portion of our theoretical foundation brings us out of the ground and continues our frame upwards, adding new, or enhancing notions such as the *naked self*, *extensions of the self*, the *networked self*, *mobility action chains* and possible *mobile with* and *mobile other* configurations therein, to the mobilities turn.

Ihde (1990) finds that we in the northern hemisphere live, move and have our being in the midst of our technologies, and that our existence is *technologically textured*. Ihde (2002) also finds that our bodies are situated, can be extended in various ways and that in our interactions with the world, the changing patterns of the lifeworld can be seen, and that:

> In this interconnection of embodied being and environing world, what happens in the interface is what is important. (Ihde 2002, p.87)

This interconnection brings our situated bodies in and through a variety of complex settings (Goffman 1959) which may enable, challenge or disable possible connections. Expressing the tight intertwining of the social and the technical, and how they must be considered together, Law and Bijker (1992, p.290) argue that all relations should be seen as both social and technical and that what might be considered the social is bound together as much by the technical as by the social. Urry (2008, p.15) informs us that what constitutes social life is heterogeneous, part of which includes material objects, including technologies, which directly or indirectly enable or disable the movement of people, objects and information. Hall (1969, pp.164-165) notes that consideration of the human environment involves systems, thereby requiring a holistic approach and that an adequate environment balances sensory inputs and provides a mix that is consistent with human's culturally conditioned needs.

2.4.2   Mobilities Turn

Here we provide an overview of the mobilities turn and begin to tease out elements that may be of importance in the consideration of seniors' mobility. Mobility is central to what it is to be human (Cresswell 2006a). All forms of social life involve striking combinations of proximity and distance, combinations that require examination of the intersecting forms of physical, object, imaginative and virtual mobility that contingently and complexly link people in patterns of obligation, desire and commitment, more increasingly over geographical distances of great length (Urry 2002). Cresswell (2006a) holds that mobility, as a socially produced motion, can be understood through three relational moments. First, there is the kind of mobility that can potentially be observed in the real world and is measured and analyzed by modellers, migration theorists and transportation planners. Secondly, there are ideas about mobility that are conveyed through various representations, which capture and make sense of it all through the production of meanings, so that movement is no longer simply movement and becomes for example 'freedom'. Thirdly, mobility is practiced, experienced, embodied and is a 'way of being in the world'. Mobile people are never simply people – they are people with meaning. Expressing this importance of meaning to mobilities Cresswell (2006a) notes that:

> Movement is rarely just movement; it carries with it the burden of meaning and it is this meaning that jumps scales. It is this issue of meaning that remains absent from accounts of mobility in general, and because it remains absent, important connections are not made. Writing on mobility remains either very specific (about commuter patterns, migrations, or dance for instance) or maddeningly abstract – the kind of work that talks of points A and B. (Cresswell 2006a, pp. 6-7)

Further, Cresswell (2006a) argues that mobility, like place, inhabits a middle ground, where:

> It is inconceivable to think of societies anywhere without either, and yet any particular way we have of thinking about them is self-evidently produced. They are social productions but necessary ones. The fact that our bodies allow us to move means that the meanings, which are produced in a myriad of ways and are mapped onto mobility are all the more powerful. (Cresswell 2006a, p.22)

Speaking to the importance of the social aspects of mobility, Canzler, Kaufmann and Kesselring (2008, p.2) argue that being mobile is not only a question of geographical space, but also of social space.   From a time and technology perspective Cresswell (2006a, pp.15-16) finds that mobility is central to Western modernity, with the word modern evoking images of technological mobility. Technology has the ability to be an enabler of mobility. As we will see later in this theoretical frame, both cars and the roads they travel on are important technologies and infrastructures that have altered many aspects of life and the built environment we live in. Also

recognizing the intricate relationship between modernity and mobility, Freudendal-Pedersen (2005, p.36) finds that living what she describes as a late modern life *demands* a certain level of mobility and that:

> The individual has to be able to get from one place to another fast, to be flexible and ready to move in a second, and most importantly have the possibility of mobility so that the idea of all the potentials embedded in everyday life does not get clouded. (Freudendal-Pedersen 2005, p.36)

Based on the earlier discussion of seniors' mobility and how it may degrade with time, this raises the interesting dilemma of having lived a life full of potentials and then facing moments where it may be diminished or constrained, within a setting that requires certain mobility characteristics. At the same time, new heightened forms of mobility may become more prevalent and leave some in its wake. Also expressing the sense of demand or force for mobility and contrasting today to earlier times Taylor (1991/2003), in the context of a city finds:

> Mobility is in a sense forced on us. Old ties are broken down. At the same time, city dwelling is transformed by the immense concentrations of population of the modern metropolis. By its very nature, this involves much more impersonal and casual contact, in place of the more intense, face-to-face relations in earlier times. All of this cannot but generate a culture in which the outlook of social atomism becomes more and more entrenched. (Taylor 1991/2003, p.59)

Old ties breaking down leaves one with the sense that something has moved along and there is little opportunity to turn back, in this case equating to mobility being forced on us. Change in our time brings forward a sense of ambivalence (Bauman 1991) where there are what appear to be contradictory elements appearing simultaneously, such as liberating and constraining dimensions (Beck 1992/2008, Habermas 1979, Horkheimer and Adorno 1997, Taylor 1991/2003). Bauman (1991) describes the deepest meaning of ambivalence as the impossibility of order (p.151) and that:

> Modern mastery is the power to divide, classify and allocate – in thought, in practice, in the practice of thought and in the thought of practice. Paradoxically, it is for this reason that ambivalence is the main affliction of modernity and the most worrying of its concerns. (Bauman 1991, p.15)

Bauman (1991) further states:

> Both order and ambivalence are alike products of modern practice; and neither has anything except modern practice – continuous, vigilant practice – to sustain it. Both share in typically modern contingency, foundationlessness of being. Ambivalence is arguably the modern era's most genuine worry and concern, since unlike other enemies, defeated and enslaved, it grows in strength with every success of modern powers. It is its own failure that the tidying-up activity construes ambivalence. (Bauman 1991, p.15)

Prigogine (1997) suggests that new orders can rise, but not to a state of equilibrium. Referring to what he describes as dissipative structures, there can be islands of new order within a sea of disorder. Kesselring and Vogel (2008, p.164) find that indicators such as increasing ambivalences put people into situations where they are forced to decide where they want to go. A sense of ambivalence can be seen in the relationship between mobility and immobility, expressed here by Urry (2003):

> Thus 'mobile machines', such as mobile phones, cars, aircraft, trains, and computer connections, all presume overlapping and varied time-space immobilities (see Graham and Marvin 2001).

> This relationality between mobilites and immobilites is a typical complexity characteristic. There is no linear increase in fluidity without extensive systems of immobilities. Thus the so-far most powerful mobile machine, the aeroplane, requires the largest and most extensive immobility, of the airport city employing tens of thousands of workers… (Urry 2003, p.125)

Urry (2007, pp.7-8) holds that there are four main senses of meaning to the term mobility, these being (a) something that moves or is capable of movement, (b) the sense of mobile as a mob (such as an unruly crowd), (c) the sense of mobility deutilized and described in mainstream sociology (such as upward or downward social mobility) and (d) mobility in the longer term sense of migration or other kinds of semi-permanent geographical movements. Urry (2007, pp.8-9) further states that the mobilities turn brings together both the physical transportation of people and digital flows. One particular perspective on mobility is in the context of a city. An early (1920s) example of considering mobility in American cities is Burgess (1925/1984):

> Mobility may be thought of in more than a fanciful sense, as the "pulse of the community." Like the pulse of the human body, it is a process which reflects and is indicative of all the changes that are taking place in the community… (p.59)

Elsewhere Burgess (1925/1984, p.60) describes how mobility can be measured not only by movement, but also by increased contacts, where he provides examples of the changing number

of letters delivered to people living in Chicago and the changing number and use of telephones in New York, Boston and Chicago (a very early example of virtual mobility). In an explanatory footnote, Burgess (1925/1984) describes his concept still further:

> The mobility of a city population incident to city growth is reflected in the increased number of contacts, changes of movement, changes in appearance, and atmosphere of specific areas due to succession of population groups, and in differences in land values. Mobility implies not mere movement, but fresh stimulation, an increase in number and intensity of stimulants, and a tendency to respond more readily to new stimulation. The process by which the city absorbs and incorporates its own offspring or foreign elements into its life, and what becomes of them, may be referred to as the metabolism of city life. Mobility is an index of metabolism. (Burgess 1925/1984, p.211)

Examining contemporary cities, while using Simmel and Goffman as reference points, Jensen (2006) states:

> First of all, the contemporary city is one characterised by *increased flows of people, symbols, and material goods*. Second, the contemporary city is linked to *multiple global-local networks* of such flows. Third, as the intensity and number of connections are, on the rise, this is *a situation of 'accelerating mobility' in the city*. (Jensen 2006, p.144) (italics in original)

Again, we can consider this in the sense that there may be accelerated mobility for some, but not necessarily for all. Exploring the production of meanings and identities in urban settings, Jensen (2007a) finds that:

> …politics and planning together with hard infrastructure may only be seen as one dimension to the contemporary urban mobility practices. These may facilitate the production of particular mobile subjectivities and identities…Thus everyday life mobility produces identification and meanings beyond the governmentality confinements of state-led mobility politics. (Jensen 2007a, p.29)

Here we begin to see that particular mobility infrastructures can create particular mobile subjectivities. Jensen and Richardson (2004, p.49) developed a framework for analyzing the spatialities of mobility, which they describe as the way sets of relations between spatial practices and symbolic meanings come together, producing rationalities that support particular forms of mobility. Jensen and Richardson (2004) carry this framework into more depth by noting that systems of infrastructure, such as motorways, among other networks, facilitate mobility across and between spaces, and they are an important spatiality of mobility as their development is closely bound up with the development of spatial relations. Jensen (2007b) notes that city infrastructures, designed to enhance mobility can create areas of segregation and mobility

inequalities. What may at first blush seem simply an enhanced mobility is an enhanced mobility for some and not for all.

Kellerman presents 'a basic model of mobility' (2006, p. 47) (see Figure 6) which attempts to outline the various elements of mobility, including both 'physical' and 'virtual' mobility and a connection to a 'fixed location (home)'. From a home perspective, Lefebvre (1991) suggests that a house can be understood in two very distinct ways; one immobile and the other as filled with mobilities, where he describes it as:

> …our house would emerge as permeated from every direction by streams of energy which run in and out of it by every imaginable route: water, gas, electricity, telephone lines, radio and television signals, and so on. Its image of immobility would then be replaced by an image of a complex of mobilities, a nexus of in and out conduits. (Lefebvre 1991, p.93)

As we will see later, this notion can be extended to consider those who are mobile, moving, in a physical or virtual sense, towards those who are relatively immobile and housebound. From its immobile perspective, Urry (2003, p.48), describes this as thinking of a house as a very clear and distinct 'region'. The mobilities perspective, on the other hand, can see a house as a 'wave', as 'permeated from every direction by streams of energy which run in and out of it by every imaginable route'. As Urry (2003) states:

> In the latter the image of immovability is 'replaced by an image of a complex of mobilities, a nexus of in and out conduits', including visitors, electricity, water, sewerage, deliveries, gas, telephone/computer connections, radio and television signals and so on. (Urry 2003, p.48)

The very location of 'home' has implications on the mobility decisions one makes, for example a home located in an urban, suburban, or rural setting, and its proximity to needs one attempts to connect with. According to Kellerman (2006) mobility decisions:

> …whether on a daily basis, such as for commuting, or for other purposes, as well as less frequent decisions, such as the purchase of mobility media, present jointly one's functionality and a person's personal needs to move. Personal needs refer to a person's level of required proximities, locomotion, curiosity and place attachment (Kellerman 2006, p.48).

Figure 6 - Kellerman's Basic Model of Mobility
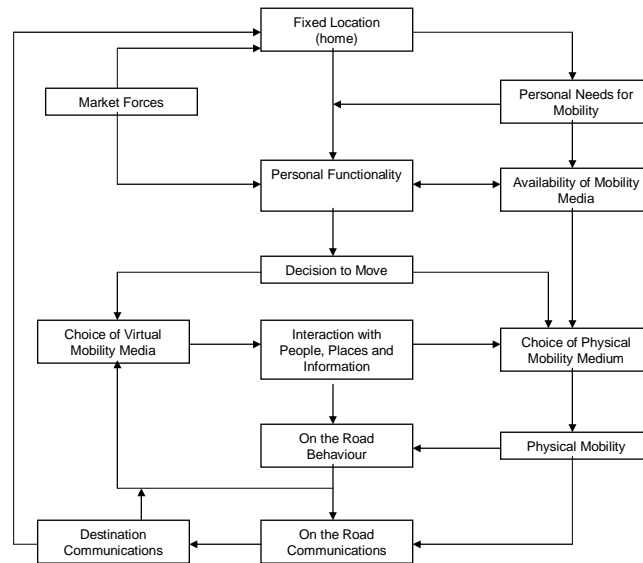
(adapted from Kellerman 2006)

If a decision is made by an individual to 'move', this movement can be made via 'physical mobility' or 'virtual mobility'. Virtual mobility may potentially serve as an alternative and substitution for physical mobility, including forms of social networking (Kellerman 2006), and further that:

> This option may materialize mainly for groups that suffer social exclusion when automobiles cannot be freely used as means of personal mobility, such as for people with disabilities (Kenyon et al 2002). Still, a politics of mobility is required for those with disabilities, so that differences in 'the mobile body' will be socially recognized, notably the special needs of people with disabilities (Imrie, 2000). (Kellerman 2006, p. 67)

Here we see the ability to possibly redesign or recalibrate one's personal mobility to address changing circumstances, such as the loss of an ability to use an important technology, such as a car. Kellerman (2006, p.37) notes that "…contrary to walking, driving is based on formal rules, laws and regulations". Kellerman (2006, p.73) also describes enabling technologies as bringing "about a 'speeding up' of the world". Here we see an attempt to look at multiple physical (starting with the simplest of all – walking (even walking involves technology in western countries)) and virtual forms of mobility, under one lens, and comparing their unique characteristics.

Focusing on everyday life, and turning more directly to mobility, Jensen (2009) sees a social environment with meaningful interaction:

> …we would argue that not only does a large part of our contemporary everyday life take place in armature and between nodes but also that the quality of the interaction (or its potential) is underestimated, both as a social environment of meaningful interaction but also as a new public domain creating cultures of movement. (Jensen 2009, p.149)

Here also, presumably, one who is immobile, or has restricted, or constrained mobility, would not be able to participate in social environments within armatures, nor cultures of movement, to the same degree as those who are fully mobile. Hall (1966, p.177) is of the view that cars insulate humans from their environment, but also from human contact. Here Anastakis (2008) demonstrates how over time cars remade and modified many of the rituals of life:

> Canadians and Americans shared similar experiences that were either created or changed by the car's arrival. The daily rituals of home and work were just as affected as the special moments that marked the passage of their lives. Coming of age, dating, weddings, children and death were all accompanied in some way by the automobile. (Anastakis 2008, p.10)

What is silent here, and yet an important element, is mobility infrastructure, in the form of roads, being available in order to bring about the altered rituals of life through the use of a car.

Rights

Mobility can be considered from a rights perspective (Cresswell 2006a, 2006b). Ignatieff (2000/2007) finds that a rights regime exists not to define how lives should be led, but to define the condition for life and the basic freedoms necessary to enjoy forms of potential agency. The right to movement has been identified as a right by the United Nations through Article 13 of the U.N.'s Universal Declaration of Human Rights (1948). It has also been recognized as the first fundamental right in the new European Charter of Rights. It has also been formally recognized constitutionally by countries such as Canada, Mexico, Japan, Germany and Ghana (Cresswell 2006a). In the United States, the right to movement has been recognized through a series of court decisions (Cresswell 2006b). We can see rights as framing possible freedoms and giving people the room to attempt to define a life they want to live, including what degree of mobility. Urry (2000, p.166) argues that there is increasing contradictions between rights, being universal, and social identities, being particular and territorially specific. Carrying this thought somewhat further, Cresswell (2006a) states that:

> …the reality of the material production of different mobilities effectively undermines rights talk, which conceptualizes mobility within a universalistic framework. The way in which rights, mobility, freedom, and citizenship have been wrapped around each other in liberal discourse has, for instance, naturalized mobility as the property of the individual, moving, able-bodied subject. (Cresswell 2006a, p. 165)

Yet, speaking more specifically to the rights of a particular group, being the disabled, Ignatieff (2000/2007, pp.117-118) argues that even when the rights are gained for the exclusive use of a particular group, others may benefit indirectly through the new level of inclusiveness, noting:

> Thus only the disabled specifically benefit when their rights of access and mobility are granted, but the rest of us benefit because the disabled are freed from dependency relationships that embarrass them and us. Once their mobility rights are guaranteed, they can look after themselves and establish relationships with the rest of us on a basis of genuine equality. The second benefit to us of specific mobility rights for the disabled is that they help our democracy to work better. We are not required to represent the interests of the disabled, since they can do it themselves. And those who represent themselves invariably do a better job than anybody else. (Ignatieff 2000/2007, pp. 117-118)

Urry (2007, p. 203) argues that the rights to movement are intrinsically exclusionary. Related to freedom and cars, Urry (2007) states that:

> Many people and organizations assert that there should be a freedom to drive, freedom of the open road and that governments should not restrict but rather enhance this freedom to drive. Such a discourse has lain behind much of the expansion and development of road building and automobility over the past century; and the car industry has been a massive 'driver' of change and development especially in generating the car-based USA…(Urry 2007, p. 206).

Urry (2007, p.207) further notes that inequalities are brought into existence between car owners and users, with high network capital, and others such as cyclists, pedestrians and children, with lower network capital, thereby creating socio-spatial inequalities. We can add seniors without an ability to drive a car to this list of others.

Freedom

Freedom and freedom of choice are concepts that appear to be immersed into much of the mobilities turn. Taylor (1991/2003, pp.2-3) believes that many are ambivalent to the freedoms that have been acquired through individualism. Speaking of the spatial and mobility characteristics of freedom, Bauman (1998) finds that:

Life ambitions are more than not expressed in terms of mobility, the free choice of place, travelling, seeing the world; life fears, on the contrary, are talked about in terms of confinement, lack of change, being barred from places which others traverse easily, explore and enjoy. 'The good life' is life on the move; more precisely, the comfort of being confident of the facility with which one can move in case staying on no longer satisfies. Freedom has come to mean above all freedom of choice, and choice has acquired, conspicuously, a spatial dimension. (Bauman 1998, p.121)

Yet, there can also be a sense of loss of freedom when the available options for mobility constrict. Taylor (1991/2003, p.5) describes a move towards "instrumental reason" which he delineates as "…the kind of rationality we draw on when we calculate the most economical application of means to a given end." At the same time Taylor states that lives have been flattened and narrowed. In turn Taylor notes that this course is introducing a loss of freedom when he writes:

The society structured around instrumental reason can be seen as imposing a great loss of freedom, on both individuals and the group – because it is not just our social decisions that are shaped by these forces. An individual lifestyle is also hard to sustain against the grain. For instance, the whole design of some modern cities makes it hard to function without a car, particularly where public transport has been eroded in favour of the private automobile. (Taylor 1991/2003, p. 9)

Kellerman (2006, p. 83) sees freedom of choice, action and movement, as it relates to personal mobilities, as having evolved through three technologies, marking historical waves, with these being (1) the introduction of the telephone in 1878, (2) the introduction of the car in 1893 and (3) the introduction of the Internet in 1994. Here we see an ongoing outward, extended, sense of mobility, in both a physical and virtual sense, and a growing sense of freedom and choice, if one is able to use the technology, over an extended period of time. Regarding the perceived freedom of driving a car, one of the participants in research by Freudendal-Pedersen (2005) notes:

"It is a world of difference because you have the freedom to drive a car. One has the freedom to drive wherever one wants whenever one wants and is not forced to wait for the public transport system". (Man, two cars) (Freudendal-Pedersen 2005, p.39)

Yet, freedom can also be found in other forms of mobility, such as Cresswell (2006a, p.213) describing walking as an essential freedom. What is not touched on, to any great degree, in this discussion of rights and freedom, other than Taylor's thoughts noted above, is the constraining nature of mobilities. If a setting only provides for a particular mobilities configuration, such as car-driver-road, there is no freedom of choice among other possible configurations, as they are not present in the setting.

Motility

Kaufmann (2002, p.37) introduced the concept of 'motility' as the capacity of a person to be mobile. Or put another way, as the way in which an individual appropriates what is possible in the domain of mobility and puts this potential to use for his or her activities. In his own words, Kaufmann (2002) states:

> …I will consider that motility is comprised of all the factors that define a person's capacity to be mobile, whether this is physical aptitude, aspirations to settle down or be mobile, existing technological transport and telecommunications systems and their accessibility, space-time constraints (location of the workplace), acquired knowledge such as a driver's licence, etc. Motility is thus constituted of elements relating to access, (i.e. available choice in a broad sense), to skills (the competence required to make use of this access) and appropriation (evaluation of the available access). (Kaufmann 2002, p.38)

We will be spending some time delineating the notion of motility, as later we will be going further in terms of delineating its *internal* and *external* relationships to the self. To achieve this we examine Kaufmann's understanding of access, skills and appropriation in some detail. According to Kaufmann (2002) 'access' refers to:

> …the range of possible choices in a place, and is comprised of networks and of flows, of territories and of places. It has two components: options and conditions. The options are comprised of the whole range of services and equipment potentially accessible in a given time unit. The conditions refer to the accessibility of the options in terms of price and schedule. (Kaufmann 2002, p.38)

By stating 'in a given time unit' as it relates to 'the options', Kaufmann appears to refer to what might be possible at a given moment in time, and therefore, presumably, that the options available can change with time. By referring to networks and flows, we begin to see that the motility of an individual involves elements external to the body. Kaufmann's concept of 'access' touches on the financial resources that may be a necessary part of motility. This then brings Kellerman's (2006) suggestion that 'market forces' play a role in mobility somewhat in line with Kaufmann's (2002) thoughts. While not directly mentioned here, based on our earlier discussion regarding seniors and mobility and driver's license regulations, Kauffman's notion of 'conditions' could also include not only pricing and schedules, but also regulatory and operational conditions that may constrain possible access. Kaufmann (2002) views 'skills' as having three aspects:

> The first concerns the physical abilities that mobility implies, ie. the ability to walk, to see, etc. The second concerns acquired skills that allow one to be mobile, for example a driving licence…The third comprises organisational skills, such as the way in which activities are planned, and involves researching information, spontaneity, and so on. Skills are thus multi-faceted and have to do with a person's age and point in his or her life course. (Kaufmann 2002, pp.38-39)

By discussing a 'person's age' and 'point in his or her life course', Kaufmann appears to recognize these as temporal variables that can impact motility and mobility at various points in time over the course of one's life. Based on considering the works of Simmel and Goffman, Jensen (2006) finds that there are learned skills and knowledge that become tools in how one makes mobility decisions. Having achieved a jurisdiction's requirements to holding a valid driver's license, steps have been taken towards opening up a particular mobility configuration, through citizenship in automobility. While skills of various sorts may be centred in the self, they can be seen as relational, as skills required in order to use, and open up possibilities, are related to particular mobility technologies and mobility infrastructures. From our earlier seniors and mobility discussion, we can see that technologies are developed which may alter, or ease, the skill level required in order to undertake certain mobility tasks. What particular configuration of technologies one has access to therefore can play a role in whether sufficient skills are in place that create access. Kaufmann (2002) describes 'appropriation' as:

> …how people interpret access and skills. Appropriation is shaped by the aspirations and plans of individuals and thus stems from their strategies, values, perceptions and habits. It is this aspect that people will use to judge whether or not access is appropriate and thus to be taken into consideration. Appropriation is also the means by which skills are evaluated and decisions made as to whether or not they are worth acquiring. (Kaufmann 2002, p.39)

What appears to not be directly contemplated here is the possible evaluation and decisions revolving around efforts and strategies that may be put into place in order to *reacquire*, or *retain*, or *sustain* skills which may potentially be in jeopardy for some reason. From our earlier discussion, an example is degrading vision, which could potentially constrain access, yet means of reconfiguration may be possible through the use of technologies such as eyeglasses. To conceptually express motility as how individuals or groups endorse movement possibilities and using them or intentionality and their relationship to mobility, Canzler, Kaufmann and Kesslering (2008) produced a 'Conceptualizing Mobility: Scheme', presented here as Figure 7.

Figure 7 – Movement, Mobility and Motility
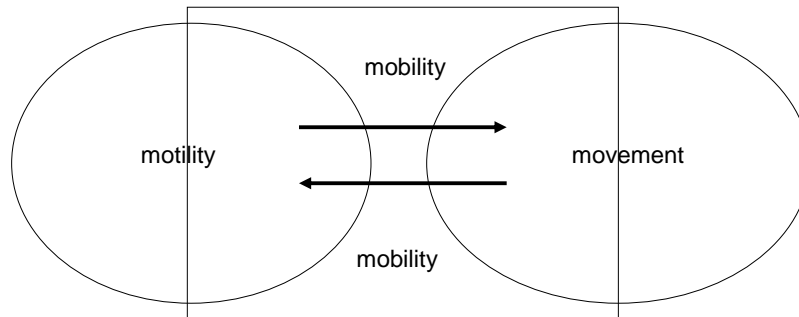
Conceptualizing Mobility: Scheme
Adapted from Canzler, Kaufmann and Kesselring (2008)

Canzler, Kaufmann and Kesselring (2008) find that:

> Motility is the capacity of an actor to move socially and spatially. This is therefore reinforced by networks and can be defined as all forms of *access* obtainable (both technologically and socially), the *skills* possessed to take advantage of this access, and their *appropriation* (or what the actor does with this access and skills). Consequently, motility is how an individual or group endorses the field of movement possibilities and uses them, also referring to intentionality. (Canzler, Kaufmann, Kesselring 2008, p.3) (italics in original)

This brings forth the importance of networks to motility and that access can take technological and social forms. Importantly, Canzler and his colleagues see motility from the perspective of an individual and also of a group. As Urry (2007, p.39) notes, Kaufmann (2002) demonstrates that simply because people can travel faster and further, they are not necessarily more mobile and that increased freedom does not necessarily result from this motility potential. This can be seen as reserve motility. If there is no desire or need to utilize this full potential, as needs can be addressed through alternative connection configurations, then it can remain in reserve, to be potentially tapped into at another point in time, if access and skills are present. At the same time, Urry (2007) finds that motility brings forth opportunities and obligations:

> …the range, complexity and choices between routeways generate the potential
> for movement or motility. High mobility provides opportunities for circulation,
> enhancing the capital for those with high mobility and worsening it for others.
> Motility also structures obligations. Opportunities entail obligations to make a
> call, to undertake a visit, to go to a conference, to reply to the email and so on.
> (Urry 2007, p.52)

Here we are presented with a sense of those carrying 'high' or 'low' mobility potential, but not directly touching the ability for this potential to 'rise' or 'fall'. To be more specific, this does not directly discuss circumstances surrounding a time where a set of obligations, tied to a certain level of motility, are in jeopardy due to a 'falling', or 'degrading' motility. Kaufmann (2002) argues that:

> *…the acquisition of motility and its transformation into mobility is built through the*
> *compromises made between aspirations, projects and lifestyle and is linked to*
> *multiple logics of action.* (Kaufmann 2002, p.45) (italics in original)

Here we are presented with the ability to *acquire* motility and transform this into mobility, while there is no direct reference to a time where motility may be lost or in decline, and what the relationship between a lost or declining motility and mobility looks like. Or expressed another way, what does the *unbuilding*, or *deconstruction* or *reconstruction*, through compromises made between aspirations, projects and lifestyle and multiple logics of action look like? Kaufmann (2002, p.45) refers to 'aspirations' as one of the important building blocks towards an acquisition of motility and transformation into mobility. If one considers an aspiration as a strong desire, then it is not necessarily rooted in a strong sense of what is truly possible potential. Kaufmann et al (2004, p.754) find that the concept of motility promotes a holistic perspective for inequality studies. Kaufmann et al (2004) also touch on the importance of quality of life when they state that:

> Motility can reveal important aspects relating to quality of life in that it would be
> adapted to study activity sequences across space and related to stability and
> shifts in social position. (Kaufmann et al 2004, p.753)

Coping Strategies

In a move towards ways of seeing how motility can be configured or reconfigured, we can consider the notion of coping strategies. Lassen and Jensen (2004) have developed a theoretical framework of everyday life mobility and coping strategies. At its centre is an individual faced with the need to develop mobility coping strategies as they make their way. Underlying and integral to this individual is their mobility, identity and work life. Moving outwards, there are push-pull factors

influencing one's mobility coping strategies, which include freedom and coercion and practice and meaning. Coercion, or the sense of some force used to gain compliance harkens to Taylor's thoughts on how difficult it can be to go against the grain. To allow this framework to be slightly more generic and include those not in the work force (for example children and seniors) it may be possible to substitute 'work life' for 'everyday life' (shown here as Figure 8). Going still further, the framework could include 'everyday life needs' at its centre. The argument for this attention to needs and its relationship to mobility is discussed shortly.

Figure 8 – Everyday Life Mobility and Coping Strategies
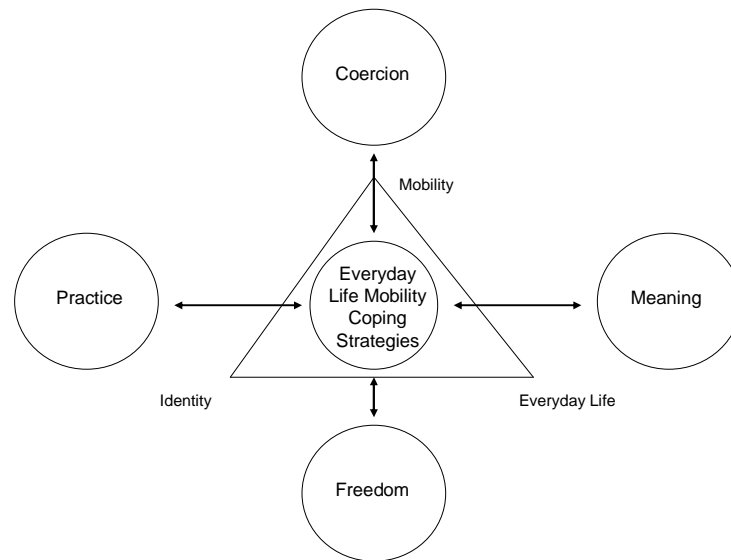
Adapted from Lassen, C., Jensen, O.B. 2004, 'Den Globale Bus – Om Arbejdsrejsers Betydning I Hverdagslivet', in Jacobsen, M.H., Tonboe, J. 2004 Arbejdssamfundet, København, Hans Reitzels Furlag, pp.241-280

As an example of a coping strategy, Lord and Luxembourg (2006) hold that the loss of automobility does not mean the end of mobility, as alternative means may be possible, yet it does bring about a complete redefinition of daily mobility practices in terms of schedules of outings, circuits and visited places.

Immobility and Related Altered Mobilities

Different scholars have begun to explore new dimensions of the mobility-immobility relationship. Adey (2007) has closely examined mobility-immobility within airports. Kesselring (2006) has considered mobility strategies that can create 'centred' or 'decentred' mobility management. To go further still, immobility can create altered mobilities of others who are in some way related to

the immobile. Bauman (1998) sees mobility and immobility, or the degree of mobility, as a form of social stratification:

> Like all other known societies, the postmodern, consumer society is a stratified one. But it is possible to tell one kind of society from another by the dimensions along which it stratifies its members. The dimension along which those 'high up' and 'low down' are plotted in a society of consumers, is their *degree of mobility* – their freedom to choose where to be. (italics in original)
>
> As a matter of fact, the worlds sedimented on the two poles, at the top and at the bottom of the emergent hierarchy of mobility, differ sharply; they also become increasingly incommunicado to each other. For the first world, the world of the globally mobile, the space has lost its constraining quality and is easily traversed in both its 'real' and 'virtual' renditions. For the second world, the world of the 'locally tied', of those barred from moving and thus bound to bear passively whatever change may be visited on the locality they are tied to, the real space is fast closing up. This is a kind of deprivation which is made yet more painful by the obtrusive media display of the space conquest and of the '*virtual* accessibility' of distances that stay stubbornly unreachable in non-virtual reality. (Bauman 1998, pp.87-88) (italics in original)

From their reading of Bauman (1991), Kesselring and Vogl (2008, p.164) state that 'The immobiles are in danger of losing in a world of global flows.' Here we are introduced to some of the complexities of mobilities, be they physical or virtual, or some combination thereof. Faced with diminished capabilities, if sufficient resources are in place, financially or through social networks, or some combination thereof, it may be possible to develop coping strategies that bring various forms of assistance to an immobile senior, rather than a senior being directly mobile. This bringing of assistance to an immobile senior is thereby altering the mobility of others. From our earlier discussion of seniors' mobility, we saw examples of this. In this sense a senior's home transforms itself from a base from which we *proceed* and *return* (Heller 1984, p.239) to a situation where the home of an immobile individual draws a new constellation of mobilities around it, resulting in a new mobility node and associated network constellation, in order to sustain the individual and their home location. This arrangement can be examined from a variety of perspectives such as the immobile individual, the family members who have altered their mobility in order to provide assistance and the care providers who come to the individual's home. Each of these perspectives is examined here briefly. From the perspective of an immobile senior, their movements beyond their home become less, minimal or non-existent. Consequently, the role and meaning of home can change. Twigg (2008) finds:

Home is familiar territory, so much so, indeed, that it can appear obvious, its complexities glossed over by the assumed and commonsensical. In fact it is a highly complex site in which material, symbolic, social, and cultural constructions mingle and interpenetrate. The coming of care potentially destabilizes and reconstitutes those meanings, refracting them through different discourses, different rationalities. Further complexity is added by the nature of the work within homecare – the fact that it involves the body – so that the symbolic and spatial relations of home and care closely interact with those of body and bodywork. (Twigg 2008, p. 229)

From an immobile senior's perspective, who is receiving assistance from a care provider, there can be concerns about the ongoing ability and sustainability of the provider to bring assistance into their home, thereby creating a sense of anxiety. In their review of research by others, Mahood and Martin-Matthews (2008) cite the following example:

One client (age 68, married, homecare client for 12 months) stated, "I couldn't stay in my own home [without homecare]. I would have to go to an institution – because I can't even manage with meals or anything, such as washing dishes or laundry". Another client (age 78, widowed, homecare client for 18 months) said "I am concerned that the service will be cancelled. I don't want to move. With my poor vision, it would take me too long to find my way around a new place". (Mahood and Martin-Matthews 2008, p.33) (brackets in original)

Describing his own immobility and the world now coming to him, Schwartz (1996) states:

Support systems are essential when you're in a state of disrepair. I am lucky to have a whole stream of friends coming through my house. I call them my support community, my angels, me dear friends. They come quite regularly to find out how I am, to exchange thoughts about spiritual issues, to let me know how much they care. Sometimes they bring dinner. They come to have dinner with me, to communicate about the news of the day or what's happening in their lives, to tell me about issues they're struggling with, things about which I might be able to offer help or advice.

As a matter of fact, there is a great deal of interchange, my giving to them and their giving to me. They tell me they are learning from me, that watching me is an inspiration to them. And in return I feel that they're continuing to keep me alive because there's so much energy and good feeling, love, concern, and care that comes from these friends, as well as from my family. Since I'm so restricted in my movements, they bring the world in. They bring themselves in. By their bringing the world in, I can get outside to some degree. (Schwartz 1996, pp.82-83)

While Schwartz is considerably immobile, when he wrote this, friends and family are altering their mobility in order to come to him. At the same time, Schwartz's mobile visitors are 'bringing the world in'. This strongly resembles Lefebvre's (1991) image of a house with waves of mobilities flowing in and out of it.

Inequality, Social Exclusion and Stratification

The creation of spaces of mobility and flow, for some, can involve creating barriers for others (Graham and Marvin 2001, p.11) thereby creating forms of stratification (Bauman 1998). Clearly not all individuals, peoples and groups have equal mobility. This unequalness can be brought about by a wide variety of factors. Hannam et al (2006) state that:

> There is a proliferation of places, technologies and 'gates' that enhance the mobilities of some while reinforcing the immobilities, or demobilization, of others…(Hannam et al 2006, p.11)

Here we see that mobility and immobility may not be static and some can experience decreased mobility, or 'demobilization', while others may gain new mobility possibilities. As an example of stratification, someone travelling in the SkyTrain, 12 metres above the streets of Bangkok, for a fee, can enjoy an air-conditioned environment and decide to leave the system at one of the assigned stations along the route. At the same time there are people 12 metres below, on the congested public roads, who may be attempting similar or very different connections (Richardson and Jensen 2008, Jensen 2007b). Previous to the introduction of the Sky Train one had to carry out their connections across a common setting of roads and related mobility technologies. In this sense one is co-present with many others also carrying out their unique connections in the same setting. With the introduction of the Sky Train, a new setting layered in with its own unique routeway characteristics, some will have the resources that open up the Sky Train as an option, while this option will remain out of reach for others, thereby creating segregated mobility patterns (Jensen 2007b). Technology enhanced mobilities can create situations where people are 'out of place at all scales' (Cresswell, p.21). From a 1960s perspective, watching the changes taking place in cities, McLuhan finds:

> Where there are great discrepancies in speeds of movement, as between air and road travel or between telephone and typewriter, serious conflicts occur within organizations. The metropolis of our time has become a test case for such discrepancies. If homogeneity of speeds were total, there would be no rebellion and no breakdown. (McLuhan 1964/1991, p.91)

Without homogeneity of speeds, and related access, stratification may be present. Manderscheid (2008) holds that 'the ability to be mobile appears to be a very crucial force for stratification' (cited in Richardson and Jensen 2008, p. 219). As the potential for mobility becomes socially polarizing, situations can develop where elites enjoy privileged degrees of mobility while 'others' remain more or less immobile or unable to control their own mobility (Bauman 1998). Beckmann (2001) believes that even under conditions of an ever growing mobility, immobile cultures continue to exist, either through involuntary exclusion or through a conscious resistance. When

we view everyday life, today, as one where technologies extend ourselves (McLuhan 1964/1991, Hall 1966) and then consider removing the easy ability to use certain mobility technologies and associated infrastructures from this arrangement, among some, while it continues to be important and prominent in use to most, we can see a form of exclusion.

Recognizing Bauman's position that mobility has become one of the most powerful stratifying factors, Jensen finds that a theory of mobility also has to be a theory of power (Jensen 2007b, p.12). Separate from skills held by the self, thereby enabling potential mobility, there can be elements of an operational nature that influence the appropriate conduct and entry to certain mobility technology and mobility infrastructure settings. As Kleinman (2005, p.12) describes it, there can be capacities and constraints that bring forward formal and informal rules of play that:

> …make possible certain actions and the realization of certain goals by some actors, while making the actions of other actors and the realization of their goals less likely. (Kleinman 2005, p.12)

In their research related to the mobility of children Fotel and Thomsen (2004, p,536) note that when analyzing mobility, the central tendency is one of polarization between those who have the means to be mobile and be a part of the space of flow, and those who do not and as a consequence are more place bound. Expressing the state one may experience, and associated symbolism, when being immobile, Bauman (1998) writes:

> Enforced immobility, the condition of being tied to a place and not allowed to move elsewhere, seems a most abominable, cruel and repulsive state; it is the prohibition of movement, rather than the frustration of an actually felt wish to move, which renders that condition especially offensive. Being prohibited from moving is a most potent symbol of impotence, incapacitation – and pain. (Bauman 1998, pp.121-122)

The sense of enforced immobility need not be thought of simply as situations of confined, or gated settings, such as a prison. Decisions related to the development and operation of particular mobility infrastructures, and their associated mobility technologies, creates situations that may enhance the mobility of some, while constraining or amputating possible extensions of others. Recognizing the importance of values in the mobility-immobility discourse, Imrie (2000), writing from a disabilities perspective states:

> The inequities of mobility and movement are connected to sociocultural values
> and practices which prioritize mobile bodies or those characterized by societally
> defined norms of health, fitness, and independence of bodily movements. Such
> bodies are as Ellis (2000, p.5) notes, "naturalized as a biological given" and
> projected as "the legitimate basis of order in a humanist world". Illustrative of this
> are the plethora of metaphors of mobility and movement which are infused with
> conceptions of bodily completeness and independence, of the (normal) body far
> removed from those with physical and mental impairments. Such
> representations counterpoise the mobile body to the immobile, the capacitated to
> the incapacitated, the abled to the disabled, and the normal to the abnormal.
> (Imrie 2000, pp.1641-1642)

Urry (2002, p.270) states that significant inequalities can constitute undesirable social exclusion. Traditionally social inclusion and exclusion literature has ignored their 'spatial' and 'mobility' attributes and where it has been discussed it has taken the form of questions of 'access' and tied to questions of disability (Cass, Shove, Urry 2005). Cass, Shove and Urry (2005) argue that the very place of multiple mobilities within contemporary social life, and especially within different social networks, affects the nature of access and citizenship (p. 540). They further note that the concept of access is complex and should not be limited to describing the exclusion of predefined groups from certain formal or public services. Rather, by defining social exclusion and inclusion with reference to the networks and practices of which people want to be a part, they avoid making specific judgments about what it is to be an active and involved member of society and they consider the relationship between social exclusion, mobility and access, to be dynamic (p. 553). Kenyon, Lyons, Rafferty (2002, pp.210-211) highlight the relationship between mobility and social exclusion when describing the process by which people are prevented from participating in the economic, political and social life of the community because of reduced accessibility to opportunities, services and social networks, due in whole or in part to insufficient mobility in a society and environment built around the assumption of high mobility. Urry (2002) finds that issues of social inclusion and exclusion cannot be examined without identifying the complex, overlapping and contradictory mobilities that are involved in the patterns of an embodied social life. Urry (2002) also finds that a socially inclusive society would elaborate and extend the possibilities of co-presence to all members and that significant inequalities with regards to access to such co-presence constitutes undesirable social exclusion. He further states that a 'good society' would minimize the conditions for co-presence (Urry 2002, p. 24).

As Urry (2007) notes, car driving has become a central element of social citizenship and many restrictions upon car drivers are therefore unpopular and resisted. Yet, mobilities themselves can generate social exclusions that reduce social proximity, social trust and social capital (Urry 2002, p.16). Urry (2002, p.15) finds that for many social groups it is the lack of mobility that is the real problem and they will seek to enhance their social capital through access to greater mobility. Social capital depends on the range, extent and modes of mobility and interventions that reduce,

channel or limit such mobilities, may weaken social capital and thereby generate new forms of social exclusion (Urry 2002). Expanding upon Kaufmann's (2002) concept of 'access', Urry (2007, p.191) argues that there are economic, physical, organizational and temporal notions of 'access' and provides examples of how not having access can result in forms of exclusion. For example, economic resources are required in order to purchase and operate a car. Noting some of the physical aspects of access (and writing as if he is describing the circumstances of many seniors!):

> ...an ability to get into or to drive a car; the difficulties involved in walking certain distances or within particular kinds of unsafe, unlit, uneven environments; the physical difficulties involved in entering particular sites; limitations on the capacity to read timetabled information; physical constraints upon carrying or moving large or weighty objects and so on. (Urry 2007, p.191)

Here we see some of the challenges to mobility where there are transitions, or passages between different mobility configurations. Moser and Law (1991/2004), examining the life of a disabled woman explore specificities, which they describe as:

> A command to do this. The capacity to do that. Liv is able, she is *able* to control the television, to open her front door, and all the rest. And, we've seen this, she can move, move around in her wheelchair. Mobility, specificity. (Moser, Law 1991/2004, p.199) (italics in original)

Also of importance here is not simply mobility-specificity, but examining in detail the passages between specificities, or said another way, the required transitions between different mobility configurations. Carrying forward Moser and Law (1991/2004) describe the networks, not just for mobility, but also for the transitions:

> Note that: on that day, and in that railway station. Because we're dealing with specificities here, specificities, and the equally specific passages between specificities. Specificities – let's remind ourselves – that are specific because they come in the form of networks of heterogeneous materials. To repeat the standard lesson from STS: if the networks are in place, if the protheses are working, then there is ability. If they are not, well then, as is obvious, there is dis/ability. So here's the proposition. Dis/ability is about specific arrays of heterogeneous materials. It is about the character of the materials which en/able those passages. And it is about the arrays which secure or don't secure them – like absent lifts. (Moser, Law 1991/2004, p.201)

Carrying this thought one step further, one could say that if the networks of heterogeneous materials are in place, along with the necessary technologies to make one's way, then there is mobility and, in their absence there may be considerable constraints, or immobility. This follows

closely Urry's (2006, p.21) 'structural holes' in semi-public space and public transport, which may not be a challenge for able bodied people, but does present challenges for women, older people, disabled and others.

Life-course Mobility

At any moment in time there are people travelling along their unique life-course, having already travelled some distance along the life-course itself, and interacting with others who may or may not be at similar points in their life-course. Two people may be of the same chronological age yet have built up lives in very different settings, having had different life experiences to date and holding, gathering or loosing varying particular skills and capabilities. In looking at a particular setting, one may see children, adults and seniors, all holding different levels of motility, when considered as individuals, all attempting to traverse a common setting through different configurations. Marshall and Mueller (2003, p.10) describe as a core principle for a large group of North American life-course researchers, is seeing that lives are not lived in isolation, but are experienced through interdependencies and that the self's actions are determined by and also influence the actions of those with whom they are associated. The life-course is taking place across a certain space of time, holding its unique circumstances including where one is situated, the available mobility technologies, mobility infrastructures of the day and the built form of the day, all contributing to the characteristics of a particular setting. Like many living animals on Earth, humans are 'on the move' a great deal of our lives (Cresswell 2006a). From our discussions to this point, we can see that among children and seniors, their mobility configurations may rely on others to some degree in order to achieve their connections with needs. This raises the interesting issue of competing, or complementary needs, in the formulation of connection configurations. This sense of interdependencies will be an important element in the next portion of our theoretical frame where we will begin to see what forms this can take in mobilities.

2.4.3   Naked Self

From our earlier investigation of motility we see that it is constituted of elements that are held centrally by the self, such as skills, and elements that enable connections across networks. Here we can dissect this still further by first stripping things away and considering the naked self and then extensions of the self. Humans are born, in a physical and technological sense, naked, with minimal individual capacities. As Ihde (1990, p.75) states:

> Only by using the technology is my bodily power enhanced and magnified by speed, through distance, or by any of the other ways in which technologies change my capacities. These capacities are always *different* from my naked capacities. (Ihde 1990, p.75) (italics in original)

With time, through individual growth and arrangements with others, technologies, and infrastructures, capacities of the self are enhanced, introducing levels of motility, in various forms and configurations, that were not previously possible. Bringing a body together with technologies has the potential to open up possibilities:

> We are bodies – but in that very basic notion one also discovers that our bodies have an amazing plasticity and polymorphism that is often brought out precisely in our relations with technologies. (Ihde 2002, p.138)

Hall (1966, p.176) describes how the human body was designed to move through the environment at less than five miles per hour, offering ways of seeing and experiencing that are altered by technologies such as cars. Also acknowledging the influence of speed and its relationship to mobility technologies, Bauman and May (2001, p.109) argue that speed depends on the tools or vehicles of mobility.

2.4.4   Extensions of the Self

Rarely is the self simply the self in some sort of isolated, independent sense. As Taylor (1989) describes it, the self establishes and attempts to maintain a story of the self. This very activity places the self in some form of situated setting, with others, and therefore is involved in a variety of weak through to strong relationships, as opposed to being seen in isolation. Mumford (1934) sees tools and utensils as extensions of the human organism. Merleau-Ponty (1962, p.xi) argues that '…there is no inner man, man is in the world, and only in the world does he know himself'. Ihde (2002) sees the many complex embodiment relationships that humans now exist within and that our *reach* (Ihde 2002, p.xi) has been extended well beyond our *naked capacities* (Ihde 1990, p.75). In the late 1950s Hall (1959, p.55) first brought forward the notion of extensions when he noted that extensions have been developed for many of the things humans used to do simply with our bodies. Later Hall began to see humans and their extensions as one interrelated system and that certain extensions may not be suited to all:

> Man and his extensions constitute one interrelated system. It is a mistake of the greatest magnitude to act as though man were one thing and his house or his cities, his technology or his language were something else. Because of the interrelationship between man and his extensions, it behooves us to pay much more attention to what kinds of extensions we create, not only for ourselves but for others for whom they may be ill suited. The relationship of man to his extensions is simply a continuation and a specialized form of the relationship of organisms in general to their environment. (Hall 1966, p.188)

This can be considered not simply from some static moment in time vantage point, but also as the availability to possible extensions increases or decreases for the self over time. McLuhan (1962, p.41) argues that if a technology extends one or more senses outside of ourselves, out into the social world, then new ratios of the senses occurs as some extensions grow while others decline. For Verbeek (2006, p.117) the 'artifacts' we deal with in everyday life help determine our actions and decisions. Graham and Marvin (2001, pp.187-188) argue that the human body enters into a myriad of 'intimate, continuous and seamless' liaisons that serve to extend the influence of the human actor across geographical scales and territories through physical and virtual mobilities. For Feenberg, (2006, p.192) the extended body is not only a body that acts through some form of technical mediation, but it also signifies itself through these mediations. Mitchell argues that one's reach now extends indefinitely:

> Embedded within a vast structure of nested boundaries and ramifying networks, my muscular and skeletal, physiological, and nervous systems have been artificially augmented and expanded. My reach extends indefinitely and interacts with the similarly extended reaches of others to produce a global system of transfer, actuation, sensing, and control. My biological body meshes with the city; the city itself has become not only the domain of my networked cognitive system, but also – and crucially – the spatial and material embodiment of that system. (Mitchell 2004, p.19)

Mitchell (2004, pp.7-8) sees his natural skin as layer zero in a nested boundary structure. Moving outward are layers that we humans have introduced over time that can include clothing, rooms in a house, houses themselves, and others, defining spaces of containers and places. At the same time these containers are associated with networks that establish a space of linkages and flows. Yet, as Mitchell states, these containers are leaky:

> My enclosures are leaky. Crossing the various boundaries that surround me are paths, pipes, wires, and other channels that spatially concentrate inflows and outflows of people, other living creatures, discrete goods, gases and fluids, energy, information, and money. I am inextricably entangled in the networks of my air, water, waste disposal, energy, transportation, and Internet service providers. (Mitchell 2004, p.8)

Importantly, Mitchell (2004) describes how flows are spatially concentrated by channels and not flowing everywhere at once. To create and maintain the differences between the interiors and exteriors, Mitchell (2004) describes how one seeks to control these networked flows. Hall (1966, p.15) argues that 'social distance' has been extended through human extensions, thereby integrating the activities of groups over greater distance and that this increased social distance is remaking social and political institutions. Hall (1976, p.26) argues that extensions can evolve much faster than the body; that it can take many generations to improve on some human capability whereas a technological extension can bring about changes more quickly. Still, Hall (1976, p.33) finds that it can take several life-times to develop a good extension system.

Connections to Needs

So we can see extensions that provide for some level of capacity to reach out. Here we turn towards what the self reaches for and the associated connections. After a discussion of connections in general, we discuss the constricting nature of extensions and the needs that the self is attempting to connect with. Simmel sees humans as a 'connecting creature' (Simmel 1997, p.174). Leaving our *naked capacities* behind (Ihde 1990), Simmel provides us with his perspective on human's early attempts at developing connections, when he writes:

> The people who first built a path between two places performed one of the greatest human achievements. No matter how often they might have gone back and forth between the two and thus connected them subjectively, so to speak, it was only in visibly impressing the path into the surface of the earth that the places were objectively connected. The will to connection had become a shaping of things, a shaping that was available to the will at every repetition, without still being dependent on its frequency or rarity. Path-building one could say, is a specifically human achievement; the animal too continuously overcomes a separation and often in the cleverest and most ingenious ways, but its beginning and end remain unconnected, it does not accomplish the miracle of the road: freezing movement into a solid structure that commences from it and in which it terminates. (Simmel 1997, p.171)

Both Simmel (1997) and Heidegger (2008) write of bridges, what we can see from today's vantage point as mobility infrastructures, and how these infrastructures change patterns of connections and relationships. Simmel (1997) sees opposing river banks, without a bridge in place, as unconnected things. Heidegger (2008) suggests that a bridge brings elements closer together, into each other's neighbourhood and that it gathers the earth as a landscape around a stream. Mobility infrastructures, such as bridges, roads, walking paths and telecommunication lines bring forward new or enhanced connections and altered relationships. Looking back a century or more, at a grand macro geographic scale, Innis (1923 and 2001) could see the complex ways that new connections not only brought formerly distant places closer together from

a time perspective, but also created changed circumstances and relationships for the communities and people living along the newly developed fur trade and rail routeways (for examples from still earlier time periods and different forms of technological connection, see Innis 2007 and 2008). We can also look to the Sound Dues at Helsingør, Denmark, in place from the 1400s to the 1800s, creating a sea travel node of significant wealth and prosperity for the state by requiring all ships, coming and going from near and far, travelling in or out of the Baltic Sea, to pay dues as they passed this critical constrained mobility point on their sea voyages (Weitemeyer 1891, Jespersen 2004). In 1920s rural America, Galpin (1920) recognized wagon carts as an important means of connecting people and places. Standing along a gravel road one was able to see which roads formed strong connections while others formed weaker connections, based on how worn down the road bed was. As Dillman (1985) describes it, these indentations in the road represented the communication lines over which almost all connections were made. From a virtual or digital perspective we can consider the ways technologies and infrastructures related to the telegraph, telephone and Internet have also reconfigured connections, when considered over an extended period of time. In a traditional, physical sense, Lynch (1960, p.47) described 'paths' as 'channels' along which people move. Kolb (2008, p.154) sees many different types of connections involving both physical spatial proximity and many new forms of digital connections. In building connections, the self is rarely traversing an empty setting. There is often an existing setting with a unique mosaic of built environment, mobility technologies, mobility infrastructures, established social patterns and relationship characteristics. Seeing this through consideration of past and current built environments McLuhan (1964) writes:

> …the medieval world grew up without uniform roads or cities or bureaucracies and it fought the wheel, as later city forms fought the railways; and as we, today, fight the automobile. For new speed and power are never compatible with existing spatial and social arrangements. (McLuhan 1964, p.100)

Scales, frequency and configuration of connections can be altered over time. An example is the introduction of the car. Galpin (1924) finds that in rural and small town America the introduction of the car brought farmers closer to town from a time and convenience perspective, to the point where farmers with cars were closer to the centre of town than someone living on the edge of town before the introduction of the car.

Several forms of narrowing down, or constriction, can take place with the use of certain extensions and their associated ability to facilitate connections. One form of constriction is the narrowing of perceived reality or options for connection. The other is the constraining nature that particular mobility infrastructures can place on particular chains of connection. From a perception perspective, we can consider Hall's (1976, p.28) notion of extensions transference, highlighting the 'intellectual maneuver' where an extension is confused with, or takes the place of the

processes that are being extended. Hall tells us that a characteristic of the transference phenomena is that people treat the transferred system as "the only reality and apply it indiscriminately to new situations." (Hall 1976, p.33) From the perspective of the constricting nature of particular mobility infrastructures, we can consider Hall's thoughts on the reductionist nature of the capacity of extensions, when he writes:

> …the human race can never fully replace what was left out of extensions in the first place. Also, it is just as important to know what is left out of a given extension system as it is to know what the system will do. Yet the extension-omissions side is frequently overlooked. (Hall 1976, p.37)

Somewhat similarly, Ihde has referred to amplification and reduction structures and McLuhan refers to enhancement and obsolescence (Mitcham 1994). Kolb (2008) finds that new and systematic connections can potentially constrain the creation or sustainability of social norms, noting that:

> Once the highway is built, the flow of goods and people will change in ways that may make some social patterns of action impossible to continue, or it may help create new patterns. Building highways and pipelines and ports, cutting down forests, locating housing here and not there, these have systematic effects that alter the possibilities for social places. (Kolb 2008, p.37)

Reflecting back on the notion of a bridge as presented by Simmel and Heidegger discussed earlier, we can picture ourselves standing next to a bridge and attempting to visualize an earlier time where there may have been minimal, or no, human connections across a river. With time there may have been small random boats controlled by traders and families making crossings, creating new social and economic connections, altering patterns and relationships on both sides. With time a formalized commercial ferry service may have been established, with formalized docks on both sides of the river (for a present day investigation of ferries and cars and intergenerational mobilities please refer to Vannini and Vannini 2008 and Vannini and Vannini 2009). Where these controlling small boats may have taken advantage of a variety of connection points along the river, perhaps at a point where it narrows, or the current is slower than elsewhere, a ferry with docks establishes a channel and begins to constrain the connections across the river. Still later, a bridge may be constructed, creating a stronger physical presence and constrained channel of connection across the river.

So far we have been discussing how the self reaches towards needs without providing some sense of what we mean by 'needs'. In a broad sense, we can consider transfers, actuations, sensings and control (Mitchell 2004, p.19), actualized through extensions, as encompassing human needs that one attempts to connect with. With limited space, we will not be establishing a

formal distinction here between needs and wants (for a brief distinction see Schwartz 1996). Morgan (1986, p.44) argues that addressing needs involves dependence on an environment for sustenance. Goffman (1953), in his dissertation, recognized human needs in relationship to social orders:

> It is possible to consider any particular social order in a crudely functional way and say that it serves to ensure that a particular set of human needs or objectives will be fulfilled in an orderly, habitual, and cooperative way. (Goffman 1953, p.345)

One could perhaps argue the mirror image of this comment in the sense that we can also look to how certain circumstances *do not* ensure, or hinders, a particular set of fulfilled human needs of particular selves. In his investigation of 'total institutions', where residents are immobile or constrained to varying degrees, Goffman (1961) finds that the 'handling' of human needs is a 'key fact' (p.6) and that they need to be planned for (p.10). Expressing the linkages between human needs and technology, Ihde (1986, pp.105-106) finds that much of what is believed to be human needs implies technology.

Across our lives we have needs and from an everyday life perspective, they can change across the life-course. As noted earlier, Kellerman (2006) includes 'personal needs for mobility' in his basic model of mobility. Maslow (1943) proposed a hierarchy of needs, with the most basic needs being physiological needs such as food, water and breathing. If the physiological needs are relatively in place, next is the safety needs, which can include among others, security of the body, family, health, property and seeking 'safety and stability in the world' and having a preference for 'familiar rather than unfamiliar things'. Next in the hierarchy is needs related to love, affection and belongingness. This in turn is followed by the esteem needs where there is a desire for a stable, high evaluation of one self, for self-respect, or self-esteem and esteem for others. This is followed by the need for self-actualization, where Maslow notes that 'what a man *can* be, he *must* be'. Maslow's hierarchy of needs, while often cited and influential, is contested (Zhao et al 2007). Needs at their most basic may or may not remain relatively constant over time, and how we reach out for, or obtain these needs, or higher forms of need, can change with time. Relating this fluidity and distinction between 'basic' needs and other types of needs, desires or wants, Ignatieff (1984) states that:

> Modern welfare may not be generous by any standard other than a comparison
> with the nineteenth-century workhouse, but it does attempt to satisfy a wide
> range of basic needs for food, shelter, clothing, warmth and medical care. The
> question is whether that is all a human being needs. When we talk about needs
> we mean something more than just the basic necessities of human survival. We
> also use the word to describe what a person needs in order to live to their full
> potential. What we need in order to survive, and what we need in order to
> flourish are two different things. The aged poor on my street get just enough to
> survive. The question is whether they get what they need in order to live a
> human life. (Ignatieff 1984, pp.10-11)

Further, recognizing that needs can change, in part due to changing times Ignatieff (1984) states:

> Yet there is an obvious difficulty: in a capitalistic society, or as Hume would have
> said a 'commercial society', economic growth constantly expands the frontier of
> necessity. The luxuries of the few gradually become the necessities of all.
> (Ignatieff 1984, p. 93)

We can see needs changing generally, in an overall sense, over time, separate from any changes in needs of specific individuals. Ignatieff presents us with a degree of relativism and plasticity to the notion of needs. Further, his description of a constantly expanding frontier of necessity and the luxuries of the few becoming the necessities of all can be applied to mobility. Mobility technologies such as the telephone, cars and devices that use the Internet (and of course their underlying mobility infrastructures such as telecommunications networks and roads) all began with a small group of users, which ultimately reached a point where they have become essential to everyday life in our time. This changing stage, with newly heightened potential motility, at least for some, can create both opportunities and obligations. As Urry (2007) describes it:

> …the range, complexity and choices between routeways generate the potential
> for movement or motility. High mobility provides opportunities for circulation,
> enhancing the capital for those with high mobility and worsening it for others.
> Motility also structures obligations. Opportunities entail obligations to make a
> call, to undertake a visit, to go to a conference, to reply to the email and so on.
> The opposite side of motility is the burden of mobility…(Urry 2007, p.52)

Multiple needs can bring about conflicts that somehow must be negotiated or resolved in order to determine a path forward. Ignatieff (1984, p.126) finds that not all needs are complementary, providing the example that the needs we have for family, home and private belonging can conflict with a need for public belonging.

In addition to undertaking typical daily activities, in order to fulfill needs, Finlayson and Kaufert (2002) find a need for mobility in order to fulfill 'social obligations'. As an example of the need for mobility in order to meet a social obligation, Finlayson and Kaufert (2002) provide the example of an 85 year old woman who visited her husband in a nursing home every day:

Woman: "I go out twice a week I'd say, maybe."
M.F.:   "Now what about all the visits to your husband?"
Woman: "Oh yes, I don't call them that."
M.F.:   "That's not, you don't count that as going out?"
Woman: "No, its not an outing. That's something I do for him because he is
               not well. It is a duty." (Finlayson, Kaufert 2002, p.80)

Considering this research, Hodge (2008) states:

These trips had special meaning in their lives and included visiting spouses in nursing homes, attending weddings and funerals, visiting sick friends and relatives, and going to cemeteries. Although these trips were not frequent, their cancellation caused significant "worry and concern." The importance placed on these trips reveals the underlying personal meaning of mobility. Moreover, in addition to helping them maintain their sense of identity and relationship, such journeys also gave these women *independence* and a *sense of control* over their lives. (Hodge 2008, p.122) (italics in original)

In their research of a 'demand-responsive' bus route in Lancashire, UK, Cass, Shove and Urry (2005) find that the mostly elderly users describe their journeys as 'just' for shopping, or to just 'pop into' the 'hub', it also identified a multitude of other 'needs' that included visiting a spouse in a care home, visiting friends, going to a café, attending a community centre, art classes, getting to work, visiting a doctor, pleasure trips, tourism and going to a pub. As Cass and colleagues note, this list of social obligations demonstrates, the range of what the otherwise 'excluded' may be attempting to access is indeed varied and '…may only be revealed through new infrastructures that uncover existing networks – but ones that are in a state of disrepair – or that finally make new (desired) connections possible.' (Cass, Shove, Urry 2005, p. 552)

Hall (1969, pp.164-165) finds that an adequate environment balances sensory inputs and provides a mix that is congenial as well as consistent with humans' culturally conditioned needs. Further, Hall (1976, p.135) finds that there has been a suppression and failure to recognize human's situational needs, resulting in distortions in the way Westerners live and the meaning we attach to life. Further, Hall (1976, p.139) tells us that following World War Two there was a brief period where there was an interest in human's 'basic needs', yet little came out of a needs approach due to an overriding influence of culture on needs. Hall argues that the fact that so many social scientists were attracted to a needs approach during this time period indicates that there was something there, but, '… we were simply not able to deal with it given the conceptual

models at the time.' (Hall 1976, p.139) Later Hall saw life as a dance where people are tied together, or isolated from one another, by invisible rhythms and that human extensions can be viewed as externalized manifestations of human drives and needs (Hall 1983, p.130). Mumford sees the purpose of transportation as bringing people and goods to where they are needed and to concentrate '…the greatest variety of goods and people within a limited area, in order to widen the possibility of choice, without making it necessary to travel.' (Mumford 1964, p.246) Considering needs in relationship to the built environment, Jacobs (1961/1992, p.230) argues that the lack of a wide range of 'concentrated diversity' can put people into their cars for many of their needs. We can return to Maslow's (1943) hierarchy of needs and consider how many of them require humans to *reach* them *through extensions*, which is strikingly different from attempting to reach needs through only our *naked capacities* (Ihde 1990, p.75). As noted earlier, scholars such as Lawton investigated needs as part of their person-environment modeling of seniors' lives. As already noted, from a mobilities turn perspective, Kellerman (2006) includes 'personal needs for mobility' in his basic model of mobility. The need to interact with others can lead towards undertaking mobilities (Kellerman 2006, p.22). Kellerman (2006, p.23) provides the example of competing needs by highlighting that there is a basic human need for proximity to others versus the human need for privacy. Kellerman also sees a human need for locomotion, which is most manifest in babies and children (2006, p.27). In addition, Kellerman sees a human need for information which can result in both physical and virtual mobilities (2006, p. 28). Here we begin to see potential needs, internal to the self, in conflict with one another, which can be investigated by considering their dynamics through the attempted connections. Going still further, we can look to the competing and complementary needs found in arrangements between the self and others, and related connection configurations.

2.4.5   Mobility Technology

Forming part of the connection between the self and needs are mobility technologies. As noted earlier, Ihde (1990, p.1) describes human existence as 'technologically textured'. We can see forms of interaction within a setting of mobility technologies and mobility infrastructures as 'embodiment relations' (Ihde 1990, p.75) and 'mediated contact with other participants' (Goffman 1967, p.5). Ihde (1990, p.75) describes embodiment relations as the double desire for 'total transparency', total embodiment, where the technology assists one 'become me'. In Ihde's words:

> Were this possible, it would be equivalent to there being no technology, for transparency would *be* my body and sense; I desire the face-to-face that I would experience without technology." (Ihde 1990, p.75)

Goffman (1971/2010, pp.6-7) describes vehicular units, where bodies can be found inside 'shells' and technologies with 'thick skins' where the thicker the skin, the more restricted the possible movements are. Ihde (2010, p.15) describes the experience of walking out of an airplane, leaving his past exo-skeleton behind as he carries on with his journey. Here we see the ability to shed a mobility technology and creating a different configuration while continuing on with some form of connection. Goffman (1971/2010, pp.6-7) also describes that a road, what we will see as a mobility infrastructure momentarily, may be able to support different kinds of shells, such as cars, bicycles, horse pulled carts and pedestrians. Hughes (2004, p.1) finds that technology is messy, complex and can be difficult to define and understand. Sismondo (2004, p.9) argues that people act in the context of available technology and that people's relations can only be understood in the context of technology. McLuhan (1964/1991, p.90) argues that all technologies can be seen as extended human systems that increase power and speed. What is perceived and used as technologies can change with time, yet regardless of the possible perceptions, it is still there playing a role in everyday life. As Akrich (1992) describes it, as time moves on, older established reliable technologies seem to fall into the background as a part of everyday life:

> After the event, the processes involved in building up technical objects are concealed. The causal links they established are naturalized. There was, or so it seems, never any possibility that it could have been otherwise. (Akrich 1992, p.222)

The outward extension of humans, utilizing technologies creates webs of networks where the social and the technical are intertwined in what Bijker and Law (1992, p.201) describe as the *seamless web view.* Bijker and Law argue that analysis should begin with a seamless web view, of various elements, and then look to how things are broken up under different kinds of circumstances.

2.4.6   Mobility Infrastructure

With an overview of mobility technology in hand, we can now move on to mobility infrastructure as an integral part of the setting of interaction and connection. Here we also consider the design and operational scripts embedded in mobility infrastructures, with a particular focus on roads and highways and how this can contribute to enabling, disabling and constraining connections. Mobility infrastructure can be thought of as an assembly of various technologies that form networks, providing connections that overcome space and distance, compressing time between connections, holding embedded design and operational scripts, and forming part of the elements of particular settings of interaction. Expressing the growth in the importance of mobility

infrastructure in recent decades and how they integrate urban spaces, Graham and Marvin (2001) note:

> In the Western world especially, a powerful ideology, built up particularly since World War II, dominates the way we consider such urban infrastructure networks. Here, street, power, water, waste or communications networks are usually imagined to deliver broadly similar, essential, services to (virtually) everyone at similar costs across cities and regions, most often on a monopolistic basis. Fundamentally, infrastructure networks are thus widely assumed to be integrators of urban spaces. They are believed to bind cities, regions and nations into functioning geographical or political wholes. Traditionally, they have been seen to be systems that require public regulation so that they somehow add cohesion to territory, often in the name of some 'public interest'. (Graham and Marvin 2001, p.8)

Also expressing how mobility infrastructure is tightly related to spatial relations, Jensen and Richardson (2004) state that:

> Systems of infrastructure like motorways, railways, telecommunications and other networks facilitate mobility across and between spaces. These networks are an important spatiality of mobility because their development is bound up closely with the development of spatial relations in society. (Jensen and Richardson 2004, p.49)

Tying the social into mobility infrastructure and how planning for them is a powerful tool in shaping social worlds, Jensen and Richardson (2004) find that:

> …enhancing mobility becomes a 'necessary element in the struggle for maintaining, changing or consolidating social power (Swyngedouw, 1993). However, as Swyngedouw realizes, the liberation of mobility, which assists the development of a globalised economy, merely reconstitutes boundaries, and creates new patterns of exclusion among changing sub-groups in society. A link is thus drawn between the macro level of strategic infrastructure planning, and the micro level of activities and perceptions in everyday life. The outcome of the progressive removal of barriers to mobility through the introduction of new infrastructure leads, however, to the reconstruction of barriers rather than to their removal. The planning of infrastructure networks is therefore a potentially powerful tool in shaping the social world, affecting issues of equity and exclusion by changing the conditions and possibilities for mobility. (Jensen and Richardson 2004, p.50)

This is similar, yet goes further in description, to McLuhan's (1964/1994) thoughts on technological extensions bringing about increases in power and speed as a disruption causing a change of organization. More specifically, from the perspective of roads, Volti (2004) demonstrates that governments have played a strong role in bringing forth road infrastructure essential for car mobility:

> Although automobile ownership has been most extensive in countries with capitalist, market-driven economies, governments have played an indispensible role in providing the infrastructure essential to automobile operation. Cars are of little value if they do not have adequate roads to travel on, and road construction has been an activity best done by some level of government. For many decades roads and the enforcement of traffic regulations were the chief areas of government involvement in automotive matters, but this began to change in the 1960s when the dangerous and destructive consequences of widespread automobile ownership became impossible to ignore. (Volti 2004, p.xii)

With time, with more roads and more cars, new challenges are brought forth, such as safety, where traffic regulations are introduced to create a safer environment on this form of mobility infrastructure.

Lynch (1960) provides a lexicon for seeing mobility infrastructures and their relationship to built environments and those attempting to traverse them. Here we can briefly consider some of his elements and terminology. 'Paths' include streets, walkways, transit lines, canals and railroads and that people observe their environment while moving through it (Lynch 1960, p.47). 'Nodes' are focal points related to travelling people, where paths converge (Lynch 1960, pp.47-48). 'Landmarks' are a form of reference point that an observer does not enter and is therefore external and can take the form of buildings or signs. Utilizing these and other elements, Lynch provides examples of how people see, experience and understand their relationship to these elements as they make their way along paths. Shane (2005) also provides a way of seeing mobility infrastructure, such as roads, and their relationship to a broader built environment and traversing them. Shane's 'armature' can been seen as a linear arrangement that defines a space of flow and of sequential experience (Shane 2005, p.198). Shane identifies 'enclaves' as a self-organizing, self-centering and self-regulating system, created by urban actors, that serves to '…slow down and concentrate nomadic flows…' (Shane 2005, p.177).

Stemmrich (2000. p.92) finds that there are various ways of seeing a highway, including across different times of day and the seasons, yet it is always accepted and never questioned. Stemmrich (2000, p.90) is also of the view that a highway demands both undivided attention and trust in the smoothness of the system among drivers. Drivers find themselves in a "…system of parallel motion, governed by rules and guided by seemingly immaterial white lines marking the lanes and the hard shoulder…" (Stemmrich 2000, p.90). While at the same time acknowledging that:

If something upsets this principle, it immediately loses its validity and becomes, within fractions of a second, a hazard. Any abrupt, sudden occurrence, not just our distractedness, may bring this about: something lying on the road ahead, a body, a tyre, a tree; something suddenly breaking down, coming apart, bursting, collapsing, dropping off, splintering; something sliding, bouncing or rolling towards us at terrifying speed, threatening to kill us. The white lines and the crash barriers, hitherto comfortably blurred, now become clear, hard and razor-sharp. They suddenly materialize as steel and concrete. Once our trusty companions, they are now our ruthless adversaries. (Stemmrich 2000, p.90)

Comparing the former Route 66, which rambled through many main streets of towns between the American Midwest and the Pacific coast, and the more recent Interstate highways that follow a similar path, but avoid close contact with traditional main streets, Falconer (2008, p.118) sees a stark contrast in their engineering and that the former Route was 'decidedly social' while the Interstate is anti-social. Highways can be seen as a space of flows, as paths, that enable linear connections to nodes and other elements. In *Building Dwelling Thinking* (2008, p.354) Heidegger describes a variety of bridges and how they gather and enable connections near and far. An old stone bridge connects a farmer's field with town thereby enabling him to bring a crop to market. Heidegger finds that things like bridges establish location. Dreyfus and Spinosa see Heidegger as meaning that '…so long as people who regularly encounter a thing are socialized to respond to it appropriately, their practices are organized around the thing…' (Dreyfus and Spinosa 2003, p.320). Now we come close to McLuhan's 'the medium is the message' (1964/1994) where:

…the personal and social consequences of any medium – that is, of any extension of ourselves – result from the new scale that is introduced into our affairs by each extension of ourselves, or by any new technology. (McLuhan 1964/1994, p.7)

We can see this in the form of road networks through the ages (pre and post the car), where the highways of today, together with cars, bring about greater time-space compression than road networks in previous eras. In terms of a modern highway system Heidegger states:

The highway bridge is tied into the network of long-distance traffic, paced and calculated for maximum yield. Always and ever differently the bridge initiates the lingering and hastening ways of men to and fro, so that they may get to the other banks and in the end, as mortals, to the other side. (Heidegger 2008, p.354)

Not only is the bridge gathering two banks and the earth, sky, gods and mortals in some local territorial sense. It is gathering, connecting and integral to a broader highway network that enables connections. Dreyfus and Spinosa (2003, p.321) suggest that Heidegger is clearly thinking of "…the postmodern autobahn interchange, in the middle of nowhere, connecting many highways so as to provide easy access to as many destinations as possible." Day or night, with cars on the highway bridge, or not, the bridge remains in place as a standing reserve, connected

to a highway system, available for potential use as drivers drive by. Of course, this availability may not be there for those who do not drive or have access to a car as a passenger. Mumford argues that highways and the connections they enable exhibit characteristics different from other mobility infrastructures, such as railways:

> And instead of the railroad *line*, which tended to centralize transportation along the main arteries, and which was more or less confined to the water level routes, at grades of two per cent or less, the motor car has brought into existence the new highway *network*. Thus the motor car can penetrate the hinterland in a more effective and economic fashion than the railroad could: for economy in railroading depends upon loading the tracks to maximum capacity and confining transportation, as much as possible, to main routes. Moreover, the motor car can climb steep grades and penetrate hilly country with a freedom unknown to the railroad…(Mumford 1938/1970, p.343) (italics in original)

Here we see different mobility infrastructures offering different levels of constraint and flexibility to those that use them. While older roads like Route 66 may have encouraged a closer interaction with one's surroundings and opportunities for entering, lingering such as stopping and, interacting with others and leaving traditional built environments, the modern highway appears much more focused on enabling connections at a grander scale and limiting interaction while on this form of linear path. Considering the fleeting experience of the highway as a place Stemmrich writes:

> Each 'place' is always closely bound up with the individual experiences of drivers who, apart from the fact that they are either behind, in front of, or next to one another on the motorway, have no connection with each other whatsoever – in this regard it is not a place but, rather, the fleeting experience of a place by many different individuals – and, moreover, there is no possibility of their communicating with one another about their actions and experiences on the motorway; in this sense they are not common actions and experiences, merely simultaneous ones, and despite their simultaneity and similarity, they are extremely individualized, indeed, it is almost as though each individual were entirely alone on the motorway. As a place, the motorway itself is endless, monotonous and of no import; it is merely the occasion for our actions and experiences; and it is the simultaneous, individual and entirely uncoordinated actions of us all, and the coincidences resulting from them, which load it with happenings which we cannot avoid experiencing, unless, that is, we stopped, got out of the car and left the motorway altogether. (Stemmrich 2000, p.91)

Here we see a common setting where numerous individuals are attempting their own unique connections and the constraints due to a design script that encourages overcoming distance quickly and well beyond the pace of the naked self. Mobility infrastructures, forming part of available extensions, can vary in their degree of 'hard crustedness', through to 'porousness', through to 'wide-openness' when considering the flexibility and plasticity of their associated possible flows. When viewed across time, newer forms of mobility infrastructure seem to bring forward harder crusts along their channel walls when compared to earlier forms. For example,

there may be limited entrance and exit points along routeways such as railways, modern highways or modern commercial airplane routes. There are most certainly nodes where the self can transition to a different routeway, yet there may be extended spaces and time where the self is unable to seep into other possible routeways. Many can describe the sensation of moving along a highway and seeing their ultimate destination off to the left or right, along a local road, yet the next interchange off of the highway is still some distance away. Or looking out of an airplane window, while it is on approach to land, and one can see their ultimate destination, yet know that it may be several hours before they can be in that location due to runway traffic, on the ground movements before the plane will be at a gate, exit the plane, clear customs, collect bags, and become part of another mobility configuration, such as the self in a taxi on a road, or, the self in a train on a rail line, en route to the final destination. There is a sense of close proximity visually between the current location of the self and their intended future location, but not in terms of a direct possible route of connection. Porous mobility infrastructures, such as sidewalks, offer opportunities for a high degree of flow flexibility. In terms of physical connections, Lynch and Hack (1984) see 'specialization' creating a loss of flexibility:

> …each gain in specialization is a loss in flexibility. It becomes more difficult to change from one mode of transportation to another, and paths are more indirect. The system is more complex and more difficult to change as need arises. (Lynch and Hack 1984, p.198)

Yet, while the self may be constrained in a physical sense, there may be opportunities for new digital connections at the same time, such as using a cellular phone or sending email while riding in a train or ferry. Nodes along routeways, such as railway stations, airports, highway interchanges, local road intersections, local walking paths and bicycle paths provide opportunities to reconfigure active, in progress flow connections. Similarly, and often unknown to the self, virtual connections have flow connections moving across routeways and nodes. We can consider the example of a cellular phone connection moving from the self to a land based tower, then along wires to another land based tower, which relays to a satellite, then another land based tower and still on to another self's cellular phone on the other side of a continent or other side of the world. Similarly, we can trace out the path of a self's Internet connections.

Humans, Technologies and Infrastructures

Together, mobility technologies and mobility infrastructures can be seen as human extensions, potentially enabling faster and farther reaching connections than possible in the past, at least for some. Together they are an integral part of the built environment setting that humans traverse in

physical and virtual ways. As Ihde notes, "Virtually all human activities implicate material culture, and this in turn forms the context for our larger perceptions." (Ihde 1990, p.18) Pinch (2010) argues that most interactions with technology are mundane, with less emphasis on changing it or innovation of new devices. Pinch (2010) further finds that technology is '…so all-pervasive in our everyday world that we scarcely notice that the objects we interact with are technological at all…' and that an important part of this 'largely invisible' world of technology is infrastructure. Hall (1966, p.3) argues that man has elaborated his various extensions to a point where it becomes difficult to see that humanness is rooted in animal nature. Going still further, as noted earlier, Hall sees humans and their extensions as one interrelated system (Hall 1966, p.188). Simmel (1971, p.335) finds that a person does not end with the limits of their physical body, or, even the area of their usual physical activity, but goes still further by embracing "…the totality of meaningful effects which emanates from him temporally and spatially" and also recognizing the "…wonders and comforts of space-conquering technique." (Simmel 1971, p.338)   McLuhan finds that new technologies can extend human senses outside themselves, into the social world, creating new ratios among the senses (McLuhan 1962, p.41). Further, Hall states:

> The relationship between man and the cultural dimension is one in which both *man and his environment participate in molding each other.* Man is now in a position of actually creating the total world in which he lives, what the ethologists refer to as his biotype. In creating this world he is actually determining what kind of an organism he will be. (Hall 1966, p.4)

In this sense we can see humans, including extensions through the use of mobility technologies and mobility infrastructures, and their social worlds, as one interrelated system, where all components are 'molding each other'.

2.4.7   Built Environment

Lynch (1960/1971, p.2) argues that movement of people and their activities is as important as the stationary physical parts. Graham and Marvin (2001, p.119) find that the shift to highways and cars has supported the shift to physical and social fragmentation and that the urban fabric has become courser, wider and stretched.

Mobile people can be seen as performers of mobility. Like actors on a stage, Goffman (1959, p.22) describes a 'performance' as all of the activities undertaken by an individual '…which occurs during a period marked by his continuous presence before a particular set of observers and which has some influence on the observers.' Goffman (1959, p.79) also notes that there can be 'performance teams' where a group of individuals cooperate in staging a single routine.

Jensen (2006, 2010) has opened this to consideration of team performances from a mobilities perspective. In undertaking a performance, as part of some form of interaction, Goffman (1959) describes a 'setting' where it takes place:

> …there is the "setting", involving furniture, décor, physical layout, and other background items which supply the scenery and stage props for the space of human action played out before, within, or upon it. A setting tends to stay put, geographically speaking, so that those who would use a particular setting as part of their performance cannot begin their act until they have brought themselves to the appropriate place and must terminate their performance when they leave it. (Goffman 1959, p.22)

Brought together, we can consider mobility technologies, mobility infrastructures and their associated built environments, as contributing to a setting where mobility connections are performed. Generally speaking, there are a multitude of complex scripts that contribute to the characteristics of any setting. In an attempt to see some of these here we consider the various scripts imbedded into an overall built environment setting by considering examples of theatre building, its stage, its audience areas, and a particular play and its associated stage props. The setting, using the term broadly, may be fixed. Yet, in focusing in on the attempted connections of individuals we can see that they may be performing mobilities across a setting of settings, where each particular setting has a unique combination of scripts which have varying degrees of constraints, friction and seamlessness or non-seamlessness, where the settings are linked together along an attempted connection. At the same time we can look to whether potential alternative pathways, within particular settings exist, and the ability for these alternatives to be linked when seen from a setting of settings perspective.

Similar to plans for mobility infrastructure, decisions are made as to where best to situate a theatre, weighing the pros and cons of possible sites. Moving in closer, a theatre's overall design, including the layout of the stage, audience spaces, back-of-theatre spaces, public spaces and how audience members and performers may move in, out and through these spaces, were designed through some earlier period or moment in time, by an individual, group, or groups. We can think of this activity as theatre design that brings forth a physical space that sets out possible or not possible activities and movement. With a stage and audience configuration in place one can consider the scripts developed by theatre managers, playwrights, set designers and actors. Theatre managers make decisions as to what plays, operas or other performances will take place within their theatre. For our purposes here we don't need to delve too deeply into how they decide on what productions will be taking place in their theatre, other than to say that decisions are made related to these matters. Perhaps a particular proposed production is determined to be too costly in terms of the number of paid actors or set requirements. Perhaps the stage and available lighting system are found to be too small for a particular production. Our intent here is

to demonstrate that before one is in the presence of an interaction between performers and an audience, some level of decision making, and narrowing down of possible assumed requirements for performances, has been considered. Now we can turn our attention to the playwright. Theatre management has selected a particular play for their theatre. Decisions are made to accept a particular set of performance scripts based on perhaps past materials or they are modified in order to address particular physical attributes, constraints, or challenges of a theatre, or matters required to address local context. There may be attempts to modify a work to avoid possible external censorship (Vargas 1960, p.214). There may be attempts to enlarge audience capacity (Orrell 1988). For example, a script may call upon actors to whisper but due to auditory dynamics of the space, the script will be altered to have actors speak with a more conversational volume. Or the script provided to back-stage personnel, such as the lighting crew, and their actions during a performance, may be altered to consider the unique lighting system at a particular theatre. Our intent here is to show that scripts may or may not be modified to address issues of local context. Next we can turn our attention to set design. Here we are referring to the set design on stage. In a larger setting context, the layout of the stage size, its location, the size and location of the audience space and how these elements relate to one another is largely fixed. This is not to suggest that these spaces cannot be altered in order to bring a particular production to life. Set designers will likely be given a budget and need to consider the size of the stage, lighting, sound, the location of set pieces on stage (including how they can be moved on and off stage by the back-stage crew) and how this relates to the movements of actors and location and sightlines of the audience.

Our purpose here is not to express some rigid image of the many and complex scripts embedded in a theatre and related performances. To the contrary, these scripts are fluid, involve many interrelated contributors and evolve over time. For example, the scripts that an audience may consider or witness at a viewing of the Tempest at the Stratford Shakespeare Festival, in the summer of 2010, in Stratford, Ontario, Canada, will be different from the original production from the 1600s or the opera versions that have been developed over the years (for more on this please consider Vickers 1974 and Roach 2000). We can use this consideration of scripting when we look at built environments, as settings, as a means of seeing the many complex actors that each may have some role that competes, or complements the work of others, towards encouraging or discouraging a variety of potential mobility patterns where mobility connections can be undertaken, and the choices individuals make therein.

2.4.8   Networked Self and Mobility Action Chains

Through skills, resources and access to available networks, the self and its extensions can attempt to configure, expand, modify, adjust, sustain and reconfigure its connections between the self and needs, all coming together as what can be considered the networked self (Jensen 2010). But before reaching this micro level, we can begin our consideration of networks at a macro scale and move our way towards the networked self. Castells (2000, p.442) sees the space of flows as the '…material organization of time-sharing social practices…'. Once we start seeing connections, at any level of investigation, we can begin to see and trace out connections created *within* networks. As Mitchell (2004) notes:

> The archetypal structure of the network, with its accumulation and habitation sites, links, dynamic flow patterns, interdependencies, and control points, is now repeated at every scale from that of neural networks (neurons, axons, synapses) and digital circuitry (registers, electron pathways, switches) to that of global transportation networks (warehouses, shipping and air routes, ports of entry). (Mitchell 2004, p.9)

We can look at networks from a macro perspective, which can provide guidance on the full spectrum of possible connections. Grand rivers of flows can be examined, tending to leave detailed examination of particular particles contained in the flows, and how they may or may not be able to utilize particular networks, out of the picture. To move in closer, we can consider the flows and pulses within particular branches of a network. Here we tend to see collective particle flows, but we also start to see how some particles may be following the fast deep middle of the river, while some particles are moving slowly on the edges, or swirl in eddies or enter a form of suspension behind blockages to flows, such man-made dams, beaver dams and log-jams. Now we begin to see the unique potential arrangements that each networked self configures, attempts to sustain and reconfigures, based on the particular characteristics of the self and the networks it may be attempting to utilize.

Through Wellman's social network analysis he has probed individuals and their relationships and the structure of these relationships within 'personal communities' (Wellman 1999, p.xiv, Wellman et al 2003). Wellman et al (2003) also describe a turn towards networked individualism as the Internet and other forms of telecommunications are layered on, opening new channels that co-exist with earlier forms of physical and virtual networks. For our purposes we are attempting to see the self in relation to possible interdependencies related to mobility that brings about connections with needs. Consequently, here as a foundational element of what will soon be described as mobility action chains, we subscribe to Jensen's (2010a) 'networked self', where:

> …mobile and mediated network relations create new conditions for the 'self' and its ability to 'present itself' and will thus ultimately contribute to changed conditions for the relation between the 'self', mobility and the network. (Jensen 2010a, p.348)

Within the networked self we can investigate its unique mobility action chains, that when all brought together, contribute to the particular, unique, networked self. Kaufmann's (2002) motility in the form of skills, access and appropriation may result in opening up, or constricting or closing down particular networked connections. From a related but somewhat different vantage point, Urry (2007, p.197) brings forward the notion of 'network capital' as the capacity to engender and sustain social relations with those who may not be proximate and which generates emotional, financial and practical benefit, often involving objects and technologies. Resembling Hall's description of extension transference, Mitchell (2004, p.15) finds that we experience networks at their interfaces and only worry about the 'plumbing' behind the interfaces when something goes wrong. Here we can consider Malabou's thoughts on being connected to networks as essential to survival:

> We have understood that to survive today means to be connected to a network, to be capable of modulating one's efficacy. We know very well that every loss of suppleness means rejection, pure and simple. (Malabou 2008, p.10)

From a networked self perspective we can trace out the attempted, successful, unsuccessful and coping strategies that bring about configured and reconfigured flows of the self as it utilizes its extensions to connect with needs, thereby establishing a self's particular 'needs network'.

Tracing Flows

Various scholars have touched on the notion of flows across spaces, settings and networks. Humans, goods and signs can be seen as particles within networked flow systems (Jensen 2009a, p.143). Flows can be seen as travelling within 'material mediators', such as technological networks (Kaika 2005, p.28). Jensen (2010b) has applied the metaphor of a river to the Nytorv public space in Aalborg, Denmark where one can see the flows of people being shaped by a 'riverbead' of curbs, basins and urban furniture. The term flows can most certainly bring forward a sense of movement and be seen through the metaphor of a river. Here we briefly explore this, seeing fluidity and change over time.

Looking at rivers, we can consider their configurations and how this alters the flow of particles. We can start with a river in a relatively natural state that experiences annual spring flooding, thereby altering the quantity of flow. The usual river configuration is unable to accommodate the

upstream flows, causing flows to spill onto neighbouring lands. During this period, the river may be wider and deeper than usual, yet the riverbed that accommodates the more typical flows of summer, fall and winter remains underneath the surface of the water, ready to re-emerge after the flooding period. Next we can consider human interventions that alter the configuration of the river in order to constrain what areas experience and do not experience everyday or peak flows. Through dredging one can make a riverbed deeper, thus enabling higher flows while appearing the same at the water's surface. Through channelizing the river walls the river's banks can be changed from a mix of rocks, pebbles, grasses and soil where water may have swirled in eddies, to a hard walled surface that keeps particles moving along at a rapid pace, with no places to linger or swirl. If the channelized walls are high enough they can accommodate the spring flood and worries of flooding move downstream. This is not to suggest that rivers cannot alter course on their own. If flows are slow, a highly meandering river can create a loop that breaks away from the main river, creating an oxbow lake, as particle flows attempt a more direct route. Elsewhere, one can see modern dry river beds where ancient rivers once flowed. Higher levels of river reconfiguration, through human-technological intervention, can take place. Floodways such as the Red River Floodway around Winnipeg, Manitoba create a 47 kilometre long parallel path for water to flow around the city and reconnect with the river, to the north of the city, as the river continues to flow northward, in an attempt to reduce flooding in the city. Rivers can be altered to accommodate hydro-electric projects, such as the James Bay project in northern Quebec which involved moving rivers and creating large spillways towards turbines. If one had high powered X-ray vision it could see the flow tunnels that take water from above Niagara Falls and bring them around the Falls and accelerate the flows as they approach turbines downstream. Once particles are in a floodway or hydro-electric water tunnel, their path is highly constrained with little opportunity to alter course. Separate from addressing potential high and low flow levels, rivers can be altered in order to make them navigable to large crafts, such as the St. Lawrence Seaway which altered the shape of the river and required some entire communities to be moved out of the way. Over time navigable waterways may be reconfigured in order to reflect the latest technologies and scale of ships, such as the Welland Canal which is now in its fourth configuration since the 1800s, between Lake Ontario and Lake Erie. What we see from these various examples are particles flowing at various rates, at various situated unique locations, in terrains that may or may not allow for flexibility, with the area available for flows changing over time. In this sense, we can see a setting of settings, where all particles do not necessarily follow the same route. Using the metaphor of a river is one possible means of seeing flows of mobile individuals. As Jensen (2010b) notes, metaphors can help frame what we see, yet may also run the risk of simplifying what is being considered.

We can also consider Burgess's (1925/1967, pp.58-59) description of mobility as the 'pulse' of the community and that it reflects and is indicative of all of the changes taking place in the community. The term pulse brings forward a sense of movement that surges from time to time, with this pulsing perhaps being a shorter time-frame than the changing flow levels of a river. In both flows and pulses, as described so far, we are considering many selves, as particles, moving along mobility infrastructures. Importantly, we are investigating forms of connections beyond simply physical ones. Canzler, Kaufmann and Kesselring (2008, p.2) describe one meaning of 'tracing mobilities' as tracing out how mobilities are inscribed into different spheres of modern life. As noted earlier, they note that being mobile involves geographical and social spaces. Both the Chicago School and Canzler et al see movements, through the use of mobility technologies and mobility infrastructures, across geographical space, as having a social component and they attempt to describe and measure this movement in some way. From the perspective of the individual Kesselring and Vogl (2008, p.167) argue that they are "…part of many flows, they live in structures, participate in networks and use scapes for the realization of plans and projects." Still other scholars have attempted means of better understanding people's movements in particular settings. Chapin (1974) developed the notion of 'human activity patterns' where he investigated 'subsocietal segments' and the ties activity patterns have with 'felt needs and preferences' (Chapin 1974, p.vii). Hägerstrand (1970) proposed a focus on people in regional science as a means of seeing activity patterns across time and space and the constraints that may hinder possibilities. Both of these examples are from an era where the attempts at tracing connections were predominantly in a physical form.

Mobility Action Chains

In building up our understanding of mobility action chains, we can turn to the self as being networked, thereby fully enabling, constraining or disabling multiple connections to needs. The networked self's (Jensen 2010a) connections with needs (Maslow 1943, Kellerman 2006) appear to be fluid and evolve across the life-course (Marshall and Mueller 2003). Mobility action chains 'pulse' and 'flow' across available mobility technologies and mobility infrastructures, creating and sustaining extensions (McLuhan 1962, 1964, Hall 1966, 1976, Mitchell 2004) of the self's networks, assuming the self has the necessary skills, access and appropriation (Kaufmann 2002). As noted earlier, Ihde (1990) informs us that by using technology the self's bodily power is enhanced and magnified by speed, through distance and that these capacities are different from the self's naked capacities. Earlier we also considered Hall's (1966) description that man and his extensions can be seen as one interrelated system and that we can examine how they are well and ill suited to those attempting to utilize them. Utilizing an approach that can be seen as a core principle to a large group of life-course researchers in North America, we can see linked lives

(Marshall and Mueller 2003) and by applying this to mobility action chains, we can see not only independent mobility of the self, but also 'mobile with' (Jensen 2010a) and mobile other arrangements and their related chains. Utilizing Hall's (1976, p.141) thoughts on 'action chains' here we introduce 'mobility actions chains' to the mobilities turn as a means of tracing (Canzler, Kaufmann, Kesselring 2008, p.2) the pulse (Burgess 1925/1967, pp.58-59), flows (Jensen 2006), plasticity and immobilities between the self, the self's networks, its needs, and how they can evolve and adapt, in an everyday sense and more broadly, across the life-course. As a means of tracing pulses and flows of connections the self is attempting to make with needs, and their complex spatial, technological and social characteristics, we can consider Hall's (1976) action chains:

> …action chains can be simple, complex, or derived. Every action within a frame has a beginning, a climax, and an end, and comprises a number of intermediate stages. If any of the basic acts are left out or are too greatly distorted, the action must be started over again. (Hall 1976, p.141)

Hall doubts if humans can do anything of a social nature that does not involve action chains. At the same time Hall recognizes the varying scales and temporality of these chains. In considering physical space, Hall suggests that action chains can be a useful tool for architects and planners, noting that research on how spaces are used '…reveals that failure to get detailed data on the action chains and the situational frames in which they occur can result in breaking the chain.' (Hall 1976, p.141) Here we are reminded of Bijker and Law's (1992) seamless, and at times not so seamless, web of connections. When all seems fine, the connections are tucked away from prominent view or awareness. When connections falter, due to issues within the self, in terms of skills, or the extensions in the form of mobility technologies and mobility infrastructures, the faltering connection becomes top of mind and very present. For our purposes, we apply Hall's action chains, enrich it with notions from the mobilities turn and refer to it as 'mobility action chains'. Recognizing the growing importance of digital connections, and how they overlay and can be used to supplement physical connections, we consider mobility actions chains in both physical and virtual forms as representative of mobilities undertaken, or potentially undertaken, to connect the self with needs along the self's networks. Hall's action chains are located within what he refers to as 'situational frames':

> There are hundreds if not thousands of different situational frames in cultures as complex as our own. These frames are made up of situational dialects, material appurtenances, situational personalities, and behavior patterns that occur in recognized settings and are appropriate to specific situations…The situational frame is the smallest viable unit of a culture that can be analyzed, taught, transmitted, and handed down as a complete entity. Frames contain linguistic, kinesic, proxemic, temporal, social, material, personality, and other components…Frames represent the materials and contexts in which action occurs… (Hall 1976, p.129)

Here Hall provides a frame that includes movement, spatiality, temporality, social, and materials, among other considerations. Importantly, Hall tells us that frames represent the materials and the context in which action occurs and that behaviour patterns are taking place in recognized settings. For our purposes we consider Hall's frame as a 'mobility situational frame' that includes networks of mobility technologies and mobility infrastructures a 'networked self' utilizes, or potentially utilizes, or is relating to, in an everyday sense, for 'mobility action chains' that connect with needs. Hall (1976, p.143) argues that some action chains are very long, requiring a life-time to be played out, while others may be only a few seconds. Further, that action chains can be thought of as transactions (Hall 1976, p.144). For our purposes here, we can see mobility action chains as transactions that connect the self with needs. Using Goffman as an anchor for what he describes as interaction ritual chains, Collins (2004) argues that the individual is an ingredient, and not the determinant, as a situation is an emergent property. Collins (2004) further states that individuals are unique at least to the extent that their 'pathways' through chains, together with their mix of situations across time, differ from the pathways of others. Hall (1976, p.154) finds that information on action chains is scarce. People tend to preserve the folklore of everyday life and they resist the notion that there is anything they don't know about themselves. In part, Hall sees this related to extension transference, some to the power of the grip of culture and some to a resistance to rearranging thinking. Further, Hall (1976, p.155) questions why someone would want to study action chains, where he replies "Because people held in the grip of action chains can never be free of them unless they see the AC's for what they are." Importantly, Hall persuades us that investigating action chains uncovers the self as interrelated to others and not autonomous or independent in their actions:

> …because in a culture that prides itself on freedom and individuality, the AC reveals that the actor, instead of being autonomous, is directly and intimately bound up in the behavior of others. (Hall 1976, p.154)

Hall (1976, p.148) sees situations where if too many chains are broken, one must compensate. Carried onward, the compensations can become so numerous that they block normal behaviour, leading to a 'derailment of dialogue' with regards to actions. A 'derailment of dialogue' again brings us close to Bijker and Law's (1992, p.201) seamless web view and how all seems fine until some sort of breakdown in a seamless web presents itself. In an attempt to keep chains connected, the self can bring forward coping strategies (Lassen and Jensen 2004), through adjustments and reconfigurations. Here we can consider Malabou's (2008, p.10) notion of the plasticity of actions within networks, where one needs to be connected, modulating one's efficacy and retain suppleness, or risk rejection. Yet in order to exhibit plasticity, there needs to be available coping strategies in the form of available alternative possible mobility action chain

configurations, from a routing perspective and the skills required for particular configurations utilized.

At one end of a mobility action chain is the central portion of the self that can change, based in part on changing skills, access, appropriation (Kaufmann 2002) and coping strategies (Lassen and Jensen 2004). At the other end of a mobility action chain are the things that are sought out in an attempt to fulfill needs. Contributing to bringing a particular mobility action chain to potential life is mobility technologies and mobility infrastructures and built environments, acting as a setting where actions can take place. The mobility action chain may involve one moving physically, or alternatively some proxy in a physical and/or virtual sense, or some combination thereof. Ihde argues that embodiment (Ihde 2010, p.6) is always relativistic in that it is a 'relation' between a human and the employed technologies (Ihde 2002, pp.137-138). These characteristics are ingredients in the creation and sustaining of particular mobility action chains. Seen from this vantage point, we see a high degree of multistability, polymorphism and plasticity in the configuration of mobility action chains. As Ihde (2002, p.138) argues, bodies have plasticity and polymorphism that is brought out through relationships with technologies. Further, Ihde holds that "…it is in the interactions, in the mutual questioning and interacting of the world and ourselves, in the changing patterns of the lifeworld that things become clear…", and still further that "In this interconnection of embodied being and environing world, what happens in the interface is what is important." (Ihde 2002, pp.86-87) Enfolding this into a mobilities perspective, we can consider everyday life mobility, where Jensen (2009a) sees a social environment, within what Shane (2005) describes as armatures, resembling what we are describing as mobility situational frames containing mobility technologies and mobility infrastructures, as a place of meaningful interaction:

> …we would argue that not only does a large part of our contemporary everyday life take place in armature and between nodes but also that the quality of the interaction (or its potential) is underestimated, both as a social environment of meaningful interaction but also as a new public domain creating cultures of movement. (Jensen 2009a, p.149)

Here, presumably, one who is immobile, or has restricted mobility, would not be able to participate in social environments within armatures (Shane 2005), nor cultures of movement, to the same degree as those who are fully mobile, bringing forward forms of stratification. Mobility action chains and mobility situational frames can fall within a wide spectrum of possibilities, from being clean, crisp and easily identifiable through to being highly complex with frames within frames and chains within chains, and involving complementary, competing and conflicting needs. Seen as a particle flow or a pulse, the mobility action chain moves across a mobility situational frame. Referring back to Goffman's 'setting', we can see that a mobility action chain may flow, or pulse, across a *setting of settings*, where the self may encounter unique design and operational

scripts, in serial fashion, as it move across multiple settings. They can also be seen through different periods of time. Like a river, we can look at the characteristics of flows on a particular day or from an everyday perspective (Jensen 2009a, Jacobsen 2009). The characteristics of the flows may change over time. There may be seasonal differences with higher water flows in the spring and lower flows in the summer. Similarly, in a built environment there may be changing flows or people in specific areas due to school classes being in session or a factory adding a new work shift to address a seasonal demand. From a longer time perspective, the river we are looking at may be glacier fed and flows are gently receding from a longer term perspective as the glacier melts away. Similarly, lumber and pulp and paper based communities may see dwindling flows within and connecting their communities to larger markets due to a news information medium shift from newsprint to digital formats. Also similarly, a life-course perspective on mobility action chains will bring forward the many changing forms of the self, its needs, its networks, the mobility technologies and mobility infrastructures utilized, any interdependencies and intergenerational arrangements, all contributing to unique mobility action chain configurations, which may go unseen from an everyday perspective.

Social Scripting

From an everyday perspective, through its attempted connections and interactions with others, in part achieved through the use of mobility technologies and mobility infrastructures, the self attempts to maintain social scripts. Jensen (2010) notes that one of Goffman's most important tools for undertaking the sociology of everyday life interaction is:

> …his 'dramaturgical metaphor' whereby social agents 'play roles' in accordance with more or less self-conscious 'scripts' for social action… (Jensen 2010, pp.334-335)

Here, referring to Goffman we can consider the scripts of performers and audiences in a general sense. From a performer's perspective Goffman (1959) speaks of scripts in this way:

> …almost anyone can quickly learn a script well enough to give a charitable audience some sense of realness in what is being contrived before them. And it seems this is so because ordinary social intercourse is itself put together as a scene is put together, by the exchange of dramatically inflated actions, counteractions, and terminating replies. Scripts even in the hands of unpracticed players can come to life because life itself is a dramatically enacted thing. All the world is not, of course, a stage, but the crucial ways in which it isn't are not easy to specify.

> For in learning to perform our parts in real life we guide our own productions by not too consciously maintaining an incipient familiarity with the routine of those to whom we will address ourselves. And when we come to be able properly to manage a real routine we are able to do this in part because of "anticipatory socialization," having already been schooled in the reality that is just coming to be real for us. (Goffman 1959, pp.71-72)

We have the sense of a script being handed down from somewhere, or someone, that is then taken into the performer, learned in some way, and then acted out. We can see social scripts in how those seeking out connections consider their possible mobility configurations. Scripts may speak to how one is expected to socially conduct themselves during a mobility performance and also in the social interactions that may be a result of the end-point of a connection between the self and a need. An example is the need to socially connect with family. There may be a script that speaks to a family gathering on a particular day and there are high expectations that all should attend. At the same time there may be scripts that speak to the social interactions during the performed connection, such as how one socially interacts with others in a car, in a train, others on a highway or in a train station. There may be scripting that speaks to what are the socially acceptable mobility configurations (or perhaps as constrained as there being only one acceptable mobility configuration) towards achieving a connection. Considering the self actualizing a mobility action chain across a setting of settings, the self may bring forward different social scripts for different portions of a chain, in an attempt to bring forward the social script that best aligns with the design and operational scripts of a particular setting. Metaphors can present us with a means of seeing in a particular way. In this sense they may bring some elements to the foreground while leaving others in the background. At the conclusion of *The Presentation of the Self in Everyday Life*, after presenting his dramaturgical metaphors, Goffman (1959) introduces one final metaphor, where he describes that scaffolds are used to build other things and should be erected with an eye towards taking them down.

The network self can be seen as undertaking various mobility configurations, including independent, mobile with and mobile other configurations. Each form of configuration is briefly described here. Separate from the mobility technologies and mobility infrastructures that may be enabling, constraining or disabling connections, we can also look to the skills a self holds, or does not hold, at a particular moment in time, related to utilizing these technologies and infrastructures, in order to actualize particular connections. We can consider these skills from the perspective of an independent self and also through interdependent relationships such as 'mobile with' (Jensen 2010a) and mobile other arrangements. Holding the necessary skills for a particular self-mobility technology-mobility infrastructure configuration, central to the self, in isolation from assistance from others, a particular connection may be actualized. Yet, there may be times where the self has not yet acquired the necessary skills. An example is the early-life self, when seen in

isolation, may not yet hold the necessary skills for certain self-mobility technology-mobility infrastructure configurations. Later in life formally held skills for particular self-mobility technology-mobility infrastructure configurations may degrade, putting the connection between the self and needs in jeopardy. If the skills held by the self are seen in isolation this could paint a rather dark picture. When seen through forms of interdependence, the self may be able to participate in certain self-mobility technology-mobility infrastructure configurations through 'mobile with' and mobile other arrangements. Through 'mobile with' connections the self reaches out to attempt connections with a need 'with' someone else who holds necessary skills for a particular configuration.

Through mobile other connections the self may be relatively immobile and the self, together with someone else, or someone else in isolation, coordinates the actions of an 'other'. Yet, when seen in series, there may be multiple and complex arrangements in order to bring about a particular connection between the self and needs. In order to connect the self with needs one may start as a walker (the self as a walker on a path, including skills to walk and navigate such as vision and balance), then transition to a self-in a bus-on a road configuration, en route to a train station, where one has to hold skills such as understanding bus routes, timetables, and how to enter and exit the bus (all in a timely manner or one may miss their stop). Upon arriving at a train station one must navigate their way through the node in order to find the appropriate train. One must know where to pay, where to look to see the schedules and routes and understand way finding signage or maps to the appropriate train platform. The train station may be busy with people who travel through this node, making their everyday connections, quickly, who have no patience for the people attempting to learn the routine for the first time or who use it only occasionally, thereby disrupting their connections. Here we consider in more detail the mobility configurations of independently mobility, mobile with and mobile other.

Independent Mobility

Independent mobility can be considered where there is no, or minimal, linkages between one who is mobile and others. On their own they have skills and access to particular mobility technologies and mobility infrastructures in order to actualize a connection (see Figure 9). At first blush, examining someone who is mobile as a car driver may have the appearance of independent mobility. They may hold the necessary skills and resources to be mobile, yet when considered in a slightly wider perspective, we can see the contextual relationships that may be setting out what this particular 'mobile self' (Jensen 2010, p.341) mobility action chain configuration looks like. Here we might learn what is the need for the action chain and is it to address solely the needs of

this particular individual behind the wheel of the car, or is it also addressing the needs of others in some way, such as children, older relatives, friends and co-workers.

Mobile With

Utilizing Goffman's (1971/2010, p.19) notion of a with, being a party of more than one who are perceived to be together, Jensen (2010, p.341) presents the notion of a 'mobile with', where in mundane everyday life we make multiple 'temporary congregations' where we slip in and out of 'mobile with' configurations. With this configuration a 'with' has the skills and access to particular mobility technologies and mobility infrastructures in order to actualize a connection (see Figure 10). Some withs may last mere seconds, such as pedestrians at a crosswalk, while others may be more complex and involve planning in advance. As Jensen (2010a, p.342) notes:

> …many times the 'mobile with' is composed of individuals very familiar with each other. We arrange a trip together with friends and family members where movement in itself becomes very central… (Jensen 2010a, p.342)

In Goffman's *Asylum* (1961), he presents a thorough picture of life within a large 'total institution', with the size and population of a small town. Being as large as it is, staff use their cars to travel from location to location while residents typically walk. Yet, there are times where staff and residents form a common mobile with:

> The automobile complex was significant here. One of the surest status symbols differentiating staff from parole patients was that of driving a car. This was very rigorously prohibited to anyone of patient status. Consequently, anyone seen at the wheel could be taken, on this ground basis to be not a patient. In part in response to this, in part perhaps as a cause of it, the staff tended to walk very little, using their cars for all but the shortest trips on the grounds. Now one of the special indulgences a staff person could give a patient was to drive him from one point to another on the grounds; this provided not only greater leeway of time before the patient's next scheduled obligation but also evidence that he was trusted by staff and intimate with them. (Goffman 1961, p. 289-290)

Where this mobile with arrangement is unavailable we can see 'segregated mobility patterns' (Jensen 2007), or more accurately segregated mobility action chains, across a common setting. From the perspective of a child, there can be constraints to mobility that can only be overcome in a mobile with configuration. As Hägerstrand (1970, p.17) describes it, a child has a small daily 'prism' unless a parent can spend time taking them from place to place.

Mobile Other

Earlier we touched on Schwartz's (1996, pp.82-83) end of life, where he notes that his movements are restricted and how his family and friends 'bring the world in' and thereby he can get out to some degree. We have also touched on care being delivered into the homes of those who are relatively immobile and require assistance to address their needs. As another example of someone who is relatively immobile, relying on the mobility of others to address their needs, we can turn to a resident living in an institution in Goffman's *Asylum* (1961, p.285):

> …I once saw a locked-in male patient employ the standard device of dropping some money in a paper bag out the window to a paroled friend below. On instruction, the friend took the money to the patient canteen, bought some potato chips and coffee, and took these in a bag to a ground-level screened window through which the originator's girl friend was able to reach them. As one can see, for the few patients in this position the hospital provided a kind of game situation in which one could pit oneself against the authorities…(Goffman 1961, p.285)

Were it not for design and operational scripts, in this particular setting, perhaps this individual could undertake independent mobility to achieve his needs, yet, under the circumstances at hand, a 'mobile other' is configured in order to address needs. Here it is the 'other' who has the skills and access to mobility technologies and mobility infrastructures, in order to actualize a connection (see Figure 10). Contemplating a future where more resources are delivered to people, rather than people moving towards resources, Hägerstrand (1970) writes:

> …what about doing away entirely with many of the retail trade establishments by equipping dwellings with refrigerators and storerooms beside the mailbox and having them filled from cruising delivery vehicles without the presence of the customer? (Hägerstrand 1970, p.8)

While Hägerstrand wrote this long before the era of on-line shopping, we can today see that services can be ordered in person, over a telephone or by internet, and then delivered to one's home physically, by a postal service, a private delivery company or in some digital way.

Design Scripts of Mobility Technologies and Mobility Infrastructures

Earlier we touched on social scripts within Goffman's dramaturgical metaphor approach. We can open up Goffman's approach to seeing a wider set of scripts, in particular design and operational scripts that the self sees in relationship to it consideration and actualizing mobility action chains. Here we turn our attention to design scripts of mobility technologies and mobility infrastructures, followed by operational scripts of mobility technologies and mobility infrastructures. Akrich (1992,

p.208) finds that similar to a film script, technical objects define a framework of action together with actors and spaces in which they are supposed to act (see also Verbeek 2006). Going still further Akrich states:

> …technical objects define actors, the space in which they move, and ways in which they interact. Competences in the broadest sense of the term are distributed in the script of the technical object. (Akrich 1992, p.216)

Graham and Marvin's acknowledgement of social biases being designed into urban infrastructure systems at any point in time, highlights that scripts of designers can enable some users while disabling others. Who one plans mobility systems (both the technologies and infrastructures) for is not always clear, or necessarily aligned with the actual users, as noted here by Richardson and Jensen (2008):

> …mobility systems are designed for certain imagined types of citizens, and urban and regional maps are drawn to fit with planners' and policy-makers' imaginaries of how these particular types of citizens will want to move in time and space. (Richardson and Jensen 2008, p.220).

Taking a rather dim view of highway engineers and factors they may be considering, or not considering, as part of their scripting efforts related to highway design, Mumford states:

> What's transportation for? This is a question that highway engineers apparently never ask themselves: probably because they take for granted the belief that transportation exists for the purpose of providing suitable outlets for the motorcar industry. (Mumford 1964, p.246)

More generally, from a built environment perspective Hommels (2008) states that:

> While few present-day architects, planners, or policy makers would be inclined to embrace the idea of physical determinism, many architectural and planning interventions have implicit or explicit social goals. (Hommels 2008, p.189)

Now with a growing image of how tightly bound the social and technology are, and how technology can hold design scripts, Latour (1992) here demonstrates how a door, as a specific technology, holds a script that is a hindrance to children and seniors:

> To use Langdon Winner's classic motto (1980): Because of their prescriptions, these doors *discriminate* against very little and very old persons. (Latour 1992, p.234)

To use Latour's language, there can be a delegation to nonhumans through scripts, where:

> Each artifact has its script, its potential to take hold of passerby and force them to play roles in its story. (Latour 1999, p.177)

Verbeek (2006, p.118) argues that just like the script given to actors in a play, telling them what to do at what time, "…material artifacts can embody implicit prescriptions for the actions of their users." Ihde (2003a, p.139) argues that material artifacts can be seen as interactants in their use context as opposed to full actants. Taken towards its limits a design script can act as a filter setting out who can and cannot utilize particular possible extensions. When a filter turns to a complete shut door we can see what McLuhan (1964/1994) describes as an amputation. If one's skills and abilities fall outside the prescribed design script of a given technology and infrastructure configuration, there may be an inability to hold together a seamless web of connections (Bijker and Law 1992, p.201), in the form of mobility action chains, through sociotechnical relationships that are possible for those who do meet the necessary script, thus 'constraining' actants (Akrich 1992, p.206). As an example, roads designed for high speed car travel greatly diminish or eliminate interaction opportunities between those in other mobility technologies, or are immobile, or as a pedestrian near the roadway. Urry (2000, p.193) describes how spaces can be democratically seized to create public roads that are open to hybrids of cars, trucks, buses and those who operate and are passengers in them, while excluding hybrids of pedestrians and cyclists. Roadways can greatly limit access and exit points as described here by Stemmrich:

> …stopping the car and/or leaving the motorway is not as easy as it may sound. There are rules governing this, and there are also prescribed places for doing it, with their own set of rules. (Stemmrich 2000, p.91)

Here we see scripts as 'rules of play'. Kleinman (2005) understands power in terms of capacity and constraint (p.12) and further states:

> We must consider how formal and informal "rules of play" make possible certain actions and the realization of certain goals by some actors, while making the actions of other actors and the realization of their goals less likely. (Kleinman 2005, p.12)

For our purposes here, we can see 'rules of play' embedded in the design of mobility technologies and mobility infrastructures and also in their ongoing operational scripts, which will be described in more detail shortly. A high speed roadway sets out the possible fast movement of people-car-assemblages while restricting the area from use by non-technologically encased people.

Operational Scripts of Mobility Technology and Mobility Infrastructure

So far we have touched on social scripts and design scripts, yet there is an additional related script that must be noted, this being operational scripts. Goffman (1967, p.91) provides the example of two wards in an asylum, that are similar from a design perspective, where staff may be exhibiting different types of regimes, thereby contributing to different patient characteristics. Stemmrich (2000, p.90) sees highways as governed by rules. Those who control the operation of a setting where mobility technologies and mobility infrastructures exist bring forward conditions on characteristics of who can utilize them and how they are used. For example, jurisdictions can set rules as to what is required in order to obtain a driver's license (Shope 2007) (see Volti 2004 for a description of the early days of the car and no driver's license requirements and Hall's (1992) autobiography where he describes being a boy, age 10, driving a car without a driver's license). Rules may bring forth signs stating no walking, hitchhiking or cycling along high speed roadways. At the same time, signs may encourage or condone certain actions or behaviours. Penalties can be set out for not following the set rules. Operational scripts can be called into question or modified where there is competing, or potentially competing, mobility technologies using a common mobility infrastructure. Here we can consider conflicts between pedestrians, bicycles, cars and streetcars for example (Jensen 2007a). Verbeek (2006, p.125) argues that there are many agreements between humans that explicitly and consciously limit their own freedom, where he includes the example of preventing people from driving too fast in areas where children might be playing. Existing or modified operational scripts may give preference to one form of mobility technology over others (see Jensen 2007a and Henderson 2009 as examples). At the same time operational scripts can be contested through competing views on what forms of mobility should be emphasized or de-emphasized.

As already noted, in Goffman's works (1961, 1967) we can see both design and operational scripts that disable, or diminish, resident's mobility. Under these circumstances residents develop their own 'transportation system' in order to connect themselves with needs:

> If a fixed stash is to be used, then obviously means have to be devised for getting the object to the stash and for removing it from the stash to the place of use. In any case, if secondary adjustments are to be efficiently worked out, an unofficial, usually undercover, means of conveying relevant objects has to be established, in short, a *transportation system*. All legitimate transportation systems can be employed as part of underlife, since for each system there will be rules about who may use it and for what, and hence the possibility for misuse. Where an individual has some freedom of movement, as in the case of a paroled patient, then a portable stash of course also functions as a means of transportation. At least three different defined objects can be conveyed in a transportation system: bodies, artifacts or things, and written or verbal messages. (Goffman 1961, p.254)

Here we again see segregated mobility action chains, where one develops a system of connections, in this case unofficially, undercover and in an underlife, that overcomes design and operational scripts. From Goffman's description of life in the asylum, we can also see that there is an element of shared understanding of acceptable variances to the formal established and understood scripts, among the actors of the setting and those setting out how the setting should be used.

Figure 9 – Independent Mobility Configuration
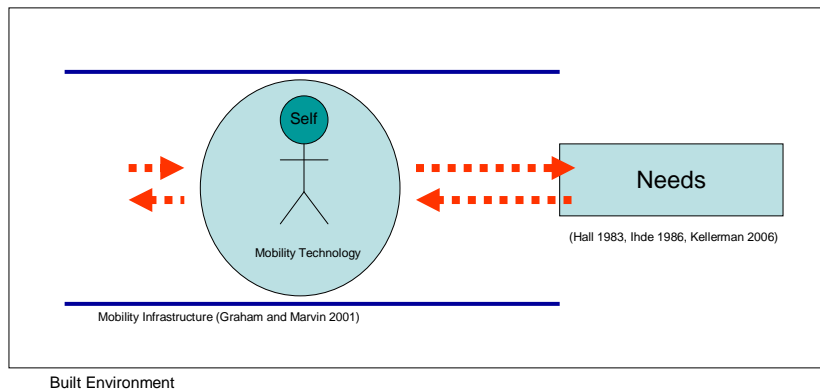
Figure 10 – Mobile With and Mobile Other Configurations
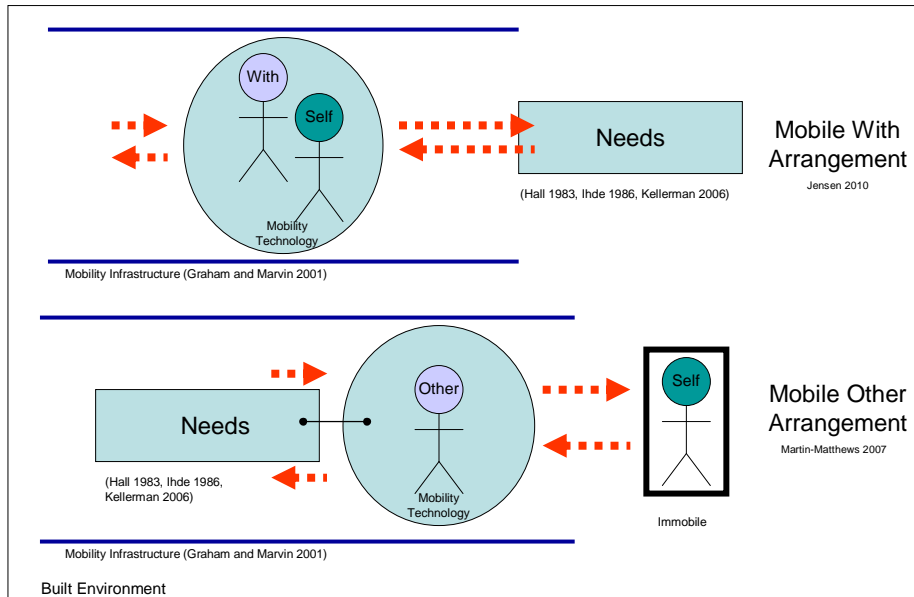
Figure 11 – Networked Self

…mobile and mediated network relations create new conditions for the 'self' and its ability to 'present itself' and will thus ultimately contribute to changed conditions for the relation between the 'self', mobility and the network. (Jensen 2010, p.348)
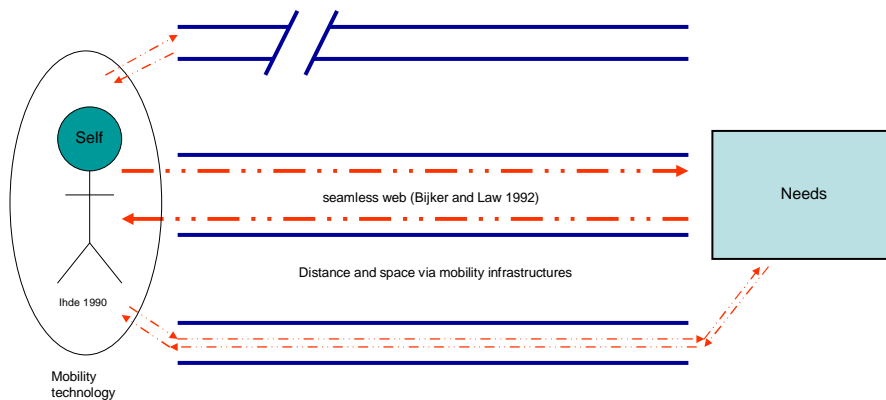
Figure 12 – Mobility Action Chains
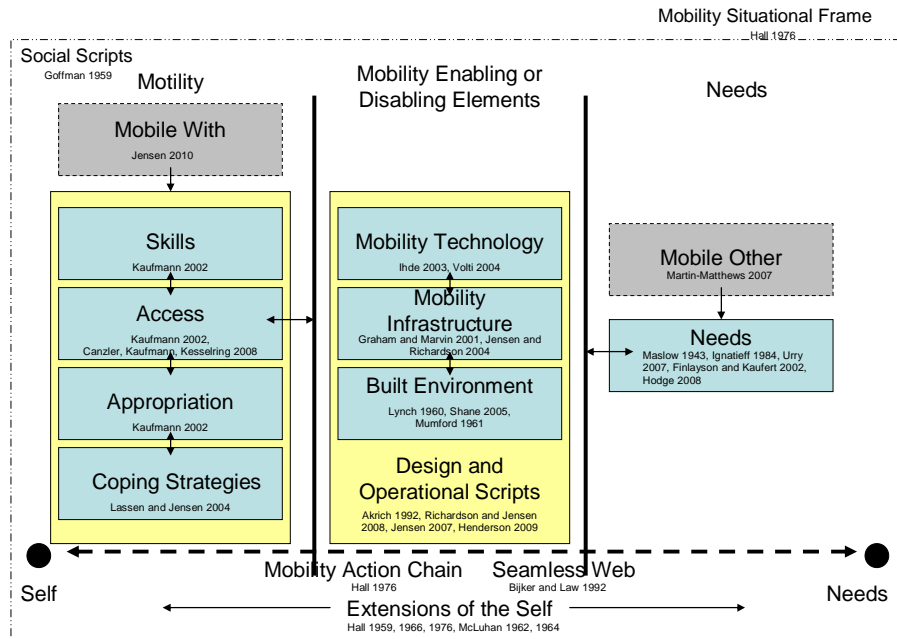
Discussion

To this point we have developed the concept of mobility action chains and considered independent mobility, mobile with and mobile other configurations. We have also investigated the mobility technologies and mobility infrastructures the self may be utilizing to connect themselves with needs as part of the networked self (see Figure 11). Figure 12 outlines the relationship between mobility action chains, motility and the social, design and operational encountered along chains. Figure 13 'Individual with Varying Degrees of Motility Attempting to Fulfill Needs Across Possible Networks' maps out more specifically a matrix of possible network connections the self may have available in order to connect with needs. At any given moment in time not all mobility technologies and mobility infrastructures are available. They may not be physically present or, access and related skills are not available, all coming together to constrain the possible available mobility action chains. Fulfilling a connection with needs may require a complex blending of mobility technologies and mobility infrastructures, through independent mobility, mobile with and mobile other configurations. Implementing coping strategies has the potential to reconfigure particular mobility action chains in order to create, sustain or reconfigure a seamless web of connections between the self and needs.

Figure 13 - Individual with Varying Degrees of Motility Attempting to Fulfill Needs Across Possible Networks

INDIVIDUAL IN A PARTICULAR LOCATION WITH UNFULFILLED NEEDS AND UNDERSTANDING OF THEMSELVES AND OTHERS AS SOCIAL INDIVIDUALS

MOTILITY

Example of skills:

Cognitive
Vision
Hearing
Balance
Walking
Driving
Finger dexterity
Navigation
(some may require technology enhancements)

COMPANION WITH MOTILITY (MOBILITY ASSISTANCE)

MOBILITY TECHNOLOGY   **MOBILITY INFRASTRUCTURE**

Examples of Physical Mobility:

Car	Road / Motorway
Bicycle	Road / Bicycle Path
Shoes	Sidewalk / Footpath
Bus	Road / Busway
Train	Railway
Scooter	Road / Path
Electric cart	Road / Path

Examples of Virtual Mobility:

Telephone	Telephone network
Internet devices	Internet network

NEEDS

MOBILE OTHER (ASSISTING IMMOBILE INDIVIDUAL)

(Kaufmann 2002, Canzler, Kaufmann, Kesselring 2008)   (Kostyniuk and Shope 2003, Taylor and Tripodes 2001)   (Akrich 1992, Sismondo 2004, Volti 2004)   (Jensen and Richardson 2004, Graham and Marvin 2001)   (Duany, Plater-Zyberk, Speck 2000, Rosenbloom 2003)   (Schwartz 1996, Martin-Matthews and Phillips 2008)

In no sense is this figure purporting to delineate all possible technologies and infrastructures, or a complete set of skills the self may hold that contributes to motility. Nor is it capturing the full potential of technologies and infrastructures that may be used simultaneously or in serial fashion as part of a single mobility action chain configuration. Not only can this figure be used to consider a variety of present day settings and unique self types, it could also potentially be used to consider particular settings at moments in the past, or in the future, where the mix of potentially available technologies and infrastructures can be considered.

3.0   Methods

3.1   Introduction

Having presented the theoretical frame for this research project, we now turn our attention to the methods undertaken, keeping in mind the research questions outlined earlier.

3.2   Case Study with Mixed Methods

As noted earlier, this research project utilizing a case study with mixed methods. Creswell (2009) argues that the framework for a research design needs to demonstrate the interconnection between worldviews, strategies of inquiry and research methods. Each of these elements, as they relate to the project, is outlined briefly here. The project is proceeding with a 'worldview' (Creswell 2009) that is postpositivist and postphenomenological, with linkages to philosophy of technology (Scharff and Dusek 2003), technoscience (Ihde 2009) and Science and Technology Studies (STS) (Sismondo 2004). Epistemologically, the relationship between the researcher and that being researched is one where there is distance and impartiality. As noted earlier a postphenomenology perspective offers an ability to consider marco and micro perception simultaneously. In his consideration of technoscience, Ihde (2009, p.38 and p.41) argues that technology has always been a part of the lifeworld and that technoscience is a hybrid of output from science and technology, now bound inextricably into a compound unit. Law (2004) describes STS as the study of science and technology in a social context. Sismondo (2004, p.12) notes that people act in the context of available technology. Looking at how technologies assist in enabling social connections, Latour (2005, p.221) describes the importance of what lies between connections. Law and Bijker (1992, p.290) argue that all relations should be seen as both social and technical.

Urry (2007, p.39) finds that mobilities related research methods need to be 'on the move' in order to simulate in a variety of ways the many forms of mobility. Further, Urry (2007) notes that a great deal of mobility involves the active development and performances of 'memory' of people and places. Büscher, Urry, Witchger (2011) argue that:

> …studies of movement, blocked movement, potential movement and immobility
> … not only illuminate important phenomena but provide compelling new modes
> of knowing. (Büscher, Urry, Witchger 2011, p.13)

The selected strategy of inquiry, for the research at hand, is a case study (Gerring 2007) with mixed methods (Creswell, Plano Clark 2007, Creswell 2009) that includes empirical, qualitative and quantitative elements, examining two case study settings. Creswell (2009) finds that mixed methods strategies can serve a transformative purpose related to marginalized groups. Using

two case study settings provides for within-case analysis and cross-case comparisons (George, Bennet 2005). Flyvbjerg (2001, p.71) argues that a case study produces context-dependent knowledge, making it possible to move from the lower to the higher levels in a learning process. Further, Flyvbjerg (2001, p.71) argues that in the study of human affairs, there is only context-dependent knowledge.

Within the two case study settings, the empirical research explores the built environment and elements that may be attempting to influence the ability or inability of seniors driving. With regards to the built environment there is observation through self observation, key informant interviews and a review of documents/literature, including mobility infrastructures and mobility technologies in the two case study settings and an examination of the historical development of the two built environments, through documents/literature and key informant interviews. Concepts such as paths, nodes, grain, armatures and enclaves will be used as reference points (for more details please see Lynch 1960/1971, Lynch 1981, Lynch and Hack 1984, Shane 2005). With regards to those who may be attempting to influence the ability or inability of seniors driving, this includes key informant interviews and a review of documentation from seniors' organizations, and various levels of government. Jensen (2007) and Richardson and Jensen (2008) examinations of the introduction of a Sky Train in Bangkok provide very useful examples of empirical mobilities research that have been used as guidance for this project.

The qualitative and quantitative research examines three types of seniors in each of the two case study settings, these being (a) seniors who drive and live in their traditional home and may or may not be self-regulating their driving capabilities, (b) seniors who have experienced a loss of automobility and have remained in their traditional home, and (c) seniors who have experienced a loss of automobility and have relocated from their traditional home. All subject types are asked to reflect on their current mobility circumstances and also to reflect on their past and possible future mobilities. The qualitative component consists of semi-structured interviews. The quantitative component was collected at the same time as the qualitative data, and consists of cataloguing key mobility elements such as social connections (see Larsen, Urry and Axhausen 2006 for an example) and fulfilling other needs requiring mobility. Examples include key places and people seniors connect with in order to fulfill their needs, the geographic distances overcome, the time required to traverse it, physically and/or virtually, and frequency. This research approach, having three types of seniors, brings forth the experiences of 'subjugates' (Haraway 1991). Haraway (1991) has expressed the importance of bringing forward the situated knowledges of subjugates.

4.0 RESEARCH FINDINGS AND DISCUSSION

Having set out the approach that was undertaken, the following outlines the findings from the empirical, qualitative and quantitative research.

Not a Blank Slate

A few words should be stated about the researcher who has compiled the empirical, qualitative and quantitative data. I, like all humans, is not a blank slate in terms of past experiences. I have a life experience that needs to be acknowledged in order to better understand elements that may contribute to why I see and present the research in the form and manner that follows. In all likelihood, another researcher might see things somewhat differently, through a different frame of life experience. I was born in Toronto Township (later to become a part of Mississauga) in 1965 to parents from Aarhus. As a young child I recall scenes of horses, cows and farmland in areas that are now fully built up residential neighbourhoods. From the age of about 4 to 20 I lived in my parents' home in Mississauga. Trips to nursery school were in my mother's car. Trips to elementary school were a mix of walking and being driven in my mother's car, if I was not feeling well or the weather was bad. High school was a longer walk from home and coincided with myself and friends beginning to obtain driver's licenses at age 16 and the negotiations involved in getting permission to use a parent's car, with some friends actually having their own cars (usually 'clonkers', some with leaky oil pans that did not sit well with parents looking to keep a clean, pristine, driveway in front of their homes). I recall the day I turned 16, my father and I drove to the office where I could take a test that allowed me to have a 'learner's permit' that gave me the right to drive a car with a parent sitting next to me.

Family vacations were usually either road trips to the New Jersey shore or flights to Denmark. The trips to Denmark took our family to Aarhus to see my grandparents and other relatives. My Farfar and Farmor lived in the south part of Aarhus, in Højbjerg. In my youth, the views out their back windows were of some scattered homes and then rolling hills. Standing in this neighbourhood now and looking in the same direction, the view is of a fully built neighbourhood. Up until his death, my Farfar was a driving instructor, whose work included teaching people with physical challenges to drive. One of his two cars fascinated me as a child. It had all sorts of tools and technologies that could be brought into use to compensate for a missing leg or arm. This included something that looked a bit like half a motorcycle handlebar, connected to the car's steering column, which had an accelerator and a braking system on it. There were turning signal arms on both sides of the steering wheel, in case someone was missing a hand or arm. This car was also automatic transmission so there were less physical movements required of a driver.

And on both cars there were pedals in front of the front seat on the passenger side so my grandfather could stop the car in an emergency. I do recall one time being in the back seat as he brought the car to a screeching halt and then calmly asked the driving student to review what just happened. With two cars, and a double car garage, my Farfar and Farmor's household seemed ordinary to my Mississauga eyes, but looking back now I see that they were somewhat ahead of the curve in terms of Danish car use and culture.

In my youngest years my Mormor lived in Aarhus city centre, at the corner of Østergade and Fredensgade. Visits with my Mormor had a very different everydayness than what I experienced in Højbjerg. In the city centre, all of our trips to shops and parks were by foot. In later years my Mormor moved to Vejlby, to an apartment near Skejbyvej and Vejlby Centervej. One of the participants in this research, lives in the same apartment community my grandmother had lived in. When visiting my Mormor here, journeys were predominantly by bus into the city centre. At the same age in Mississauga I did not ride in buses and most of my journeys were in my parent's cars. At the end of my Mormor's life she lived in the nursing home in Vejlby, very close to where some of the participants in this research live.

Upon initially revisiting these settings as part of the research at hand, I had a 1970s and 1980s image that transitioned to present day through my mobile encounters. Back in Mississauga, after highschool I undertook a Bachelors in urban and regional planning at a university in Toronto's city centre. Here I became familiar with buses in Mississauga, the regional trains into the city and the buses, streetcars and subway system in Toronto. My work career and Bachelors and Masters studies have been predominantly focused on seniors' issues, with a particular focus on their relationship to housing and communities. This has included working on the development of retirement communities in Niagara, teaching computer and internet courses to seniors at Ryerson University, being a policy advisor to Ontario's Minister of Seniors and Long-Term Care, and for the last six years, working on the development of retirement residences and long-term care homes for a company that owns and manages seniors' housing in Canada and the United States.

In short, I came into this research project with considerable life experience in one of the two settings and a somewhat dated view of the other setting. With over twenty years of work experience touching on seniors' issues in Canada, I have first hand experience seeing the challenges that no longer being able to drive a car, in a setting that is built predominantly around the car, creates. With the slate exposed, we can turn to the empirical research, with Mississauga presented first, followed by Aarhus.

4.1 Empirical Research

Here we commence with outlining the empirical research gathered over three plus years in the two case study settings, Mississauga, Ontario, Canada and Aarhus, Denmark. This research includes discussions with key informants and multiple visits to both case study settings, both before and after the qualitative research interviews, as a means of focusing on elements raised by the research participants. This research also included building up an understanding of the history of both settings, to assist in seeing how elements have contributed and evolved, in a historical sense, and how they may be contributing to everyday mobilities in our time.

The Canadian Setting - Mississauga, Ontario, Canada

Located along the north shore of Lake Ontario, within the southern area of the province of Ontario, in Canada is the city-region of Greater Toronto. At the centre of this city-region is the City of Toronto with a ring of suburban municipalities surrounding it. To the immediate west of the City of Toronto is the area's largest suburban municipality, the City of Mississauga. Before moving directly to the City of Mississauga and the specific case study setting, next we provide some general background on distance and infrastructure over time and historical settlement in southern Ontario. Stretching from the Atlantic Ocean to the Pacific Ocean and north to the Arctic Ocean, throughout Canadian history there has been the challenge of overcoming great distances. To overcome this distance infrastructures have been developed, creating enhanced mobility opportunities and unifying territory, including a transcontinental railway and major road projects. Each is explored briefly here.

The 1860s were a tumultuous time in North America. The United States experienced a civil war, President Abraham Lincoln was assassinated, an American trans-continental railway had been achieved and the United States acquired the Alaskan Territory from Russia. Watching these events just beyond their border, in 1867 four British North American colonies joined together as provinces (Ontario, Quebec, New Brunswick and Nova Scotia) in a new nation known as Canada. In 1871 British Columbia, located on the Pacific Ocean, joined Canada, making the creation of Canadian trans-continental railway a condition of their joining. Thus, a project to link and unify all British North American territory commenced. In the introduction to a book about Sanford Fleming's 1870s expedition, exploring potential railway corridors across the vast territory, the Secretary to the Expedition, George Grant (1873/2000) wrote:

> Was it wise then, for the Dominion to undertake so gigantic a public work at so early a stage in its history? It was wise, because it was necessary. By uniting together, the British Provinces had declared that their destiny was – not to ripen and drop, one by one, into the arms of the Republic – but to work out their own future as an integral and important part of the grandest empire of the world. They had reason for making such an election. They believed that it was better for themselves and their neighbours; better for the cause of human liberty and true progress, that it should be so. But it is not necessary to discuss the reasons. No outside power has a right to pronounce upon them. The fact is enough, that on this central point, the mind of British America, from the Atlantic to the Pacific is fixed. But, to be united politically and disunited physically, as the different parts of Prussia were for many a long year, is an anomaly only to be endured so long as it could not be helped; and when, as in our case, the remedy is in our own hands, it is wise to secure the material union as soon as possible (Grant 1873/2000, pp. 7-8).

So an important form of mobility infrastructure was brought into being, bringing about the ability for people and goods to move along a ribbon of steel from the Atlantic to the Pacific, unifying the provinces and territories. Along its length this new railway mobility was creating and altering the shape of Canadian city development. As Hodge and Gordon (2008) state:

> Railroad development, undoubtedly a boon to economic development of communities, strongly affected the pattern of their growth. Typically, the railway passenger station 'anchored' one side of the downtown commercial area, and on the other were the freight yards and industrial area and, frequently, the port. Housing development spread out from this core, but not evenly, for the freight yards proved to be both a physical and psychological barrier to residential growth. (Hodge and Gordon 2008, p.54)

A further example of the distances that had to be traversed and an attempt to overcome it is the Trans-Canada Highway, now running from the Atlantic to the Pacific Oceans. Growing up along the Pacific Ocean in British Columbia, Coupland (2002) here expresses his sense of the highway:

> The Trans-Canada Highway goes from Victoria, British Columbia, to St. John's Newfoundland: 7821 kilometres (4,860 miles). It's a lovely thing when you're young, to be on this road, driving in your parents' car, imagining that if you keep on going you'll end up at the other end of the country. Americans have their interstates, but save for Route 66 – which is now technically gone, replaced by a wide number of new highway configurations – none, I think, seizes the national imagination in the same way the Trans-Canada does with Canadians. It's our Big Road. It's our spinal cord. It's our escape hatch. It's our ace up the sleeve. It's a lot of metaphors embodied in one thing. (Coupland 2002, p.118)

Upon his arrival as Ontario's first lieutenant-governor in 1792, Graves Simcoe set about planning roads and settlements. His plans included proposed roads between small existing and future settlements. Major roads such as Yonge Street and Dundas Street (which traverses Mississauga), where laid out during this era in part to encourage settlement:

> Although few roads were built in advance of settlement, accessibility in most parts of Southern Ontario away from the immediate lakefront depended on a road. Yonge Street, opened between Toronto (then York) and a point near Lake Simcoe in 1795, and Dundas Street, built west from the western end of Lake Ontario to the Grand River at about the same time, did precede settlement as did colonization roads built to Georgian Bay in the 1840s and to the Shield in the 1850s and 1860s. All these roads attracted some settlers along them. As early as 1801, for example, more than two-thirds of the lots along Yonge Street were occupied, although settlement north of Toronto was also taking place well away from Yonge Street in areas connected to the outside by roads which settlers themselves opened. (Harris and Warkentin 1991/2005, p.118)

While from a present day vantage point they would be considered rustic, these and other early roads projects were an important form of mobility infrastructure in southern Ontario. Both the railway and the major roads projects introduced mobility infrastructures to their settings, altering connections, and have contributed a symbolic weight to connecting distant places and the sense of scale. Expressing the vastness and distances that must be overcome within Canada, from a modern day perspective, Coupland (2002) writes:

> You can never overstate how large a country Canada is. Everything is far away from everything else; nothing is close to anything. And a sizable chunk of the Canadian identity is defined both by how we pretend this isn't the case, and how we can be so shockingly cavalier about plane hops like Vancouver to Winnipeg or Montreal to Halifax. In Europe or Asia, such distances would cover a half dozen countries and societies…Canadians are the same as Americans about this – Texans will drive two hours to go out for dinner. But whereas the Continental U.S. has cities plunked about its forty-eight states with quite equal spacing, Canada (at least the inhabited part) is a skinny Chile-like entity that stretches across the continent. To the north, for millions of square kilometres, lies nothingness, and this vast space looms large in the Canadian mind. In our national anthem, it's called the True North strong and free. (Coupland 2002, p.26)

So while the territory has remained relatively constant, the mobility technologies and mobility infrastructures used to overcome the distances have changed, tightening up the time required to overcome the distances.

At the time of the first contact with Europeans in 1615 Iroquoian and Algonquin speaking First Nations peoples lived in the area that would become known as the City of Mississauga. By the early 1700s an Ojibwa group known as the Mississaugas occupied the area. In the 1720s the French established trading posts along the north shore of Lake Ontario, with one being located at the mouth of the Credit River. With time the area started to come under British control. In 1806 the British government purchased land in the "Mississauga Tract" (an area that extended from Burlington Bay (present day City of Hamilton) in the west, to Etobicoke Creek in the east (the

present day border between the City of Mississauga and the City of Toronto), from the Mississaugas. As will be described in more detail shortly, the lands were surveyed, establishing a lot fabric and delineated future roads and nodes of settlement. Land grants were given as part of a program encouraging settlers. The location of aboriginal settlements existing at the time of the European settlement in Canada had some influence on the development of new European derived settlements. In Southern Ontario aboriginal peoples (Huron and Iroquois) were successful farmers, growing corn and living in longhouses with small fortified villages (Hodge and Gordon, 2008 p. 42). Hodge and Gordon (2008, p.43) note that if early European settlers were clever, they paid careful attention to where aboriginal communities were situated, in part due to their access to river transportation.

As part of a program for settlement, lands were surveyed in great detail, giving settlers a clear indication of available lands and the roads that would link them to their needs, including markets. The surveying of lots and road patterns led to an initial dispersed settlement pattern that has had a strong legacy on present day, coarse grained settlement patterns:

> In a sense, dispersed settlement had been imposed on the Ontarians. Yet while they railed against many aspects of government land policy, few of them complained about a survey system that made it virtually mandatory for a farmer to live on his own land and in isolation from his nearest neighbors. Of course most of the Americans in Ontario had known no other system, and only a small percentage of the settlers from the British Isles had once lived in compact, agricultural villages. But as other traditions were discarded in migration, dispersed settlement must have accorded with most Ontarians' economic and social objectives, and it should be understood in these terms. (Harris and Warkentin 1991/2005, p.125)

In the 1800s the Crown acquired lands along Lake Ontario in the vicinity of the Credit River. In 1850 Toronto Township was incorporated with a rural character surrounding the villages along the Credit River (Port Credit, Erindale, Streetsville and Meadowvale) and scattered elsewhere within the Township (Clarkson, Lorne Park, Cooksville, Dixie, Summerville and Malton). At the same time, nearby to the east, with its good harbour and good trunk roads Toronto, by 1851 was now the largest city in Upper Canada (Ontario's original name) with 30,000 people, and this growth would continue with the laying down of railways in the 1850s and 1860s (Harris and Warkentin 1991/2005, p.152-154). Two important features of early Toronto Township, acting as paths for mobility, were the Credit River and Dundas Road. The river acted as a means of transportation, including as a safe harbour at its outlet with Lake Ontario, trade and a source of power for mills. Dundas Road had been strategically located well north of Lake Ontario to provide safe movement between the provincial capital, Toronto, and other major centres, such as Hamilton to the west. With time another important feature, acting as a path encouraging development, was a railway line running east-west across the southern portion of the Township.

Through the first half of the 1900s further road improvements and highways decentralized development while railway stations centralized growth near them. As a City of Mississauga report (2004) on its evolution notes:

> Road improvement was key in promoting urban development. In contrast to the railroads which centralized growth in established centres, the newly paved highways facilitated the decentralization of residents and industry to the outskirts of established centres like Toronto. Improvements to Lakeshore Road in 1914, which was the first highway paving project in Ontario, and construction of the new King's Highway in 1937 (later called the Queen Elizabeth Way) which was the first paved four lane thoroughfare with night lighting, opened the way for large scale development in Toronto Township. (Mississauga 2004, p.7)

By 1950 the northern half of Toronto Township was still rural while the area south of Dundas (now Street) was predominantly suburban. By this time the development of roads and highways was picking up steam:

> Toronto Township became more accessible with the construction of Highway 401 in the late 1950s, the widening of Lakeshore Road to four lanes in 1967, and the widening of the QEW [Queen Elizabeth Way] to six lanes by 1979. North-south connections were also improved with the widening of Hurontario Street in 1963, the widening of Highway 427 in 1971 and the construction of the Erin Mills Parkway. (Mississauga 2004, p.8) (square brackets added here)

Port Credit was incorporated as a town separate from Toronto Township in 1961. In 1962 Streetsville also became a separate town. In 1968 the remainder of Toronto Township became the Town of Mississauga. Finally in 1974 the towns of Mississauga, Port Credit and Streetsville came together as the City of Mississauga. Since the 1970s, development of the city has continued generally from south to north, to a point now where the city has few Greenfield development opportunities remaining. The population growth of what is today the City of Mississauga is shown in Table 5 – Population Growth - City of Mississauga. The City of Mississauga has a land area of 289 square kilometres and with a 2006 population of 668,549, this represents a density of 2,313 people per square kilometre. Today Mississauga is the sixth largest municipality in Canada by population. The City of Mississauga is part of the Regional Municipality of Peel (population 1,159,405 in 2006 and land area of 1,242 square kilometres), which also includes the City of Brampton (population 433,806 in 2006) and the Town of Caledon (population 57,050 in 2006), both located to the north of Mississauga. The Region of Peel flanks the western edge of the new amalgamated City of Toronto (population 2,503,281 in 2006).

Since the 1970s the City of Mississauga (population 258,000 in 1976) has experienced considerable development and population growth. The City is now nearing its fully built-out form, with future growth being predominantly in the form of intensification.

Table 5 – Population Growth - City of Mississauga

Year	Toronto Township	Port Credit	Streetsville	Total (now City of Mississauga)
1809	175	-		
1821	803	226		
1835	4,000	-	500	
1851	7,539	400	1,000	
1901	5,208	650	522	
1921	6,981	1,123	615	8,719
1931	9,935	1,635	661	12,231
1941	12,481	2,160	709	15,350
1951	28,528	3,643	1,139	33,310
1956	47,053	6,350	2,648	56,051
1961	62,616	7,203	5,056	74,875
1966	93,492	8,475	5,884	107,851
1971	156,070	9,442	6,840	172,352
1976				250,017
1981				315,055
1986				374,005
1991				463,388
1996				544,382
2001				612,925

Note: Toronto Township, Port Credit and Streetsville are all former municipalities that are now a part of the City of Mississauga – Data Source: Mississauga 2004

Mississauga has experienced explosive population growth since the 1970s. At the time the new city was attracting predominantly young families and the policies and infrastructure reflected these demographics. In recent years the City of Mississauga has recognized the changing demographics:

> Mississauga developed over half its existing housing stock within the last 30 years and received a large influx of young families. It is these persons who chose Mississauga as the community in which to raise their families that will form the future older adult population. (Mississauga 2005, p.6)

The development pattern of the 1970s and 1980s was largely based on an automobility model, with a large separation between residential and other uses, created a coarse grained texture of land uses and limited public transit, thereby giving importance to cars and the ability to drive. Through the 1990s, the pattern continued, but voices opposed to this sprawling form of development began to be heard. As Urbaniak (2009) sees this phase of the city's development:

> But [Mayor] McCallion has hinted that her new cause was prompted by her perception, in the late 1990s, of a subtle shift in public mood. In the summer of 2001, after hosting an international conference of 'healthy cities', McCallion explained that she saw the seeds of a new 'urban reform movement' in the Greater Toronto Area. The general mood was shifting in favour of managing growth, providing better public transportation, and protecting agricultural and natural areas. The *Globe and Mail* [newspaper], which seldom reports on Mississauga politics, was now seeking out retirees who were isolated in their homes because there was no where to walk. 'There is no "there" there', the *Globe* quoted one Mississauga writer. 'There are no attractive betwixt and betweens…only isolated islands of activity. (Urbaniak 2009, p.194) (square brackets added here)

While with time the City of Mississauga began to recognize that a less sprawling form of development and more public transit may be a better approach, there remained a strong adherence to the car and roads:

> Yes, she [Mayor McCallion] had embraced Smart Growth and now realized that the city had a responsibility to provide good public transit, but she still continued to call for the provincial government to widen highways, arguing for example, that highway 401 should be widened from six to twelve lanes through Mississauga. The 'induced traffic' theory – it's 'like cursing obesity by loosening your belt' (the more you widen the highways the more the city will sprawl and the less likely residents will be to get out of their cars) – did not make much of an impression on her. (Urbaniak 2009, p.201) (square brackets added here)

Throughout this development process, the original roads surveyed at the time that the lots and concessions were originally laid down, became the backbone, and strong, prominent paths, for more roads and highways (Sewell 2009, p.70). With a strong sense of adherence to automobility, the scale of development and the separation of land uses grew:

Just as the grid road system of the nineteenth century provided opportunities in those years for the development of farms and settlements, this larger-scale grid servicing the automobile provided development opportunities for the twentieth-century, albeit it [sic] on a much different scale. The nineteenth-century grid spawned small lots, compact buildings, mixed use districts, and pedestrian activity. The mid-twentieth-century grid spawned large development parcels, single use districts, and vehicular movement as a desirable activity, almost to the exclusion of transit and walking.

Development happened practically everywhere in the fringes and, since there seemed to be no constraints, most of the development was at very low density, consuming vast quantities of land. (Sewell 2009, p.71)

The City of Mississauga is relatively flat, having been a former lake bed of a much larger ancient Lake Ontario, with the land rising to the north from the current shoreline of Lake Ontario. The exception to this is the wide river valleys of the Credit River and the Etobicoke Creek running north-south across the city. This made both agricultural development and later suburban development, proceed with few natural encumbrances.

In 2003 the City of Mississauga commissioned a report, titled 'Growth in a Maturing Community' by Hemson Consulting, which sets out population forecasts and identifies emerging trends and issues that the city should consider going forward. The study notes that the transition from a fast growing and relatively young population to a more stable and older population will indeed have implications to city community planning and transit, among other services and activities. In 2001, 8 per cent of the population of Mississauga was age 65 and older. The Hemson report forecasts that the age 65 and older population will grow to 25 per cent in 2031. This same report notes that the city is in a transition from a fast growing suburban municipality to a mature urban community, that historically Mississauga has accommodated a large share of housing and population growth in the Greater Toronto Area (population 5,113,149 in 2006) and that in the next five to ten years, as the city's greenfield-related housing nears full development, housing growth will focus on medium and high density forms of intensification. Table 6 shows the elderly population in Mississauga, Toronto and Ontario in 2006.

Table 6 – Elderly Population – Mississauga and Ontario - 2006

Age Group	City of Mississauga Population	Province Of Ontario Population	City of Mississauga Per Cent of Total Population	Province Of Ontario Per Cent of Total Population
Age 65+	65,700	1,649,180	9.8%	13.6%
Age 75+	27,755	780,990	4.2%	6.4%
Age 85+	6,350	191,810	0.9%	1.6%
Total Population	668,550	12,160,282	100%	100%

Source: Statistics Canada on-line data, 2006

To date the primary means of transportation in Mississauga has been by private automobile on a public road network. Mississauga Transit, the public transit authority operated by the City of Mississauga follows the existing public road network. The City of Mississauga has developed with a high separation of land uses, which may contribute to a high car use. In 2007 the City of Mississauga, nearing the end of its greenfield development era, and seeking a vision for the future, held a series of public participation sessions that included 110 community meetings and round table discussions. One session representative envisioned a city '…that is more than just a place to put people. [It would be] a place that doesn't require a car to get anywhere.' (Urbaniak 2009, p.227) The consultants assisting the City of Mississauga with the consultation condensed the thousands of ideas presented into eighteen planks that would represent potential priorities moving forward. Some of the planks included:

> Neighbourhoods need 'personalities'. Density is good, if done right…Make transit an overarching priority – even if it hurts and even to the point of reducing the available automobile lanes. Redesign existing subdivisions to make it easy to walk from place to place. (Urbaniak 2009, pp.227-228)

Viewing the City of Mississauga through mobility infrastructures and associated flows that enable automobility, one can see wide roadways, drive-throughs, shopping malls with large parking areas, highways and homes designed to accommodate cars in garages and driveways. This emphasis on automobility has contributed to restraining infrastructure for other forms of mobility. In recent years bus lanes and bicycle paths have been added within the paved portion of some

major roads. Few separated bicycle lanes exist today while some are being planned for. While the needs of the population have changed with aging in place, the road layout and other infrastructure design has remained relatively constant, with a strong reliance on cars for mobility. The city itself acknowledges this challenge in their 2009 Action Plan:

> The physical layout of Mississauga – with numerous curving streets and cul-de-sacs – makes it challenging to provide convenient transit service to many areas. (Mississauga 2009a, p.15)

Elsewhere, in a report considering the implications of an aging population, the city has acknowledged that there needs to be consideration for life after the ability to drive a car:

> When no longer able to drive themselves, older adults start to depend on other modes of transportation such as ride sharing, taxis, and increased use of public transit. Issues related to accessible buses, bus shelters, modified bus routes and schedules, and assisted transit, will become more prevalent and may require changes in current practices and procedures. (Mississauga 2005, pp.5-6)

To help overcome the 'curving streets and cul-de-sacs' the City of Mississauga has recently set as a target that in the future, 75 per cent of all residents and businesses should be within a 10-minute walk of a transit stop (Mississauga 2009a, p.15). The City of Mississauga's 2009 Strategic Plan sets a bold target of doubling the percentage of the population using public transportation, and uses Copenhagen as inspiration:

> Today, in 2009, Mississauga is a city designed for the automobile. Just over 11% of the population chooses to travel by transit. Doubling that to 22% will require substantial strategic investments and a re-ordering of priorities. It's a lofty goal, but not without precedent.
>
> Many cities have strategically invested in their cycling and transit infrastructure and had a dramatic impact on their modal split. In Copenhagen, Denmark, for instance, approximately two-thirds of commuters currently travel by transit and bicycle.
>
> With a historical suburban development pattern, separated land uses, and a road network which focuses traffic to a limited number of main roads, Mississauga will find it challenging to reach a modal split close to what Copenhagen enjoys. (Mississauga 2009a, p.11)

As noted briefly above, and expanded upon here, the city, in their 2009 Strategic Plan, recognizes that the existing settlement pattern is a hindrance to reconfiguring mobility options:

> Vast areas of single land uses limit the viability of alternative mobility options such as transit and cycling, and require movement by automobile. This situation has led to unsustainable and unhealthy consequences. Costs to the municipality are higher, such as serving roads, transit, and providing community infrastructure…Children, women and older adults are particularly vulnerable to the detrimental impacts of automobile-dependent development patterns. (Mississauga 2009b, p.34)

Still, more focused on seniors' mobility, the city's new Strategic Plan recognizes the existing challenges that the suburban development pattern has created:

> Mississauga's aging population has dramatic implications for the infrastructure of the city and service delivery. Many residential subdivisions have few, if any, amenities within walking distance, and are not well served by transit. These are particularly unfriendly environments for older adults. Without access to an automobile, they can face social isolation, or lengthy travel times for any complex trips. (Mississauga 2009b, p.35)

Today Mississauga is a large suburban community, with its municipal officials, very recently beginning to recognize and plan for the changing needs of its population, including less reliance on automobility. Obviously this was not always the case, in earlier decades, where the car and more roads were seen as signs of progress. With the development of the areas surrounding Canada's pre-World War Two era cities, a wave of suburban development proceeded. As Hodge and Gordon (2008) describe it:

> Suburban development further accelerated in the 1950s and 1960s. The total effect was an extraordinary transformation: by 1996, most Canadians lived in suburbs built after 1945 – the country had changed from an urban to a suburban nation. Surprisingly, these momentous social and economic forces that reshaped Canadian communities were anticipated and somewhat encouraged by national planning efforts for the post-war period…, as well as by early metropolitan planning in Winnipeg and Toronto… (Hodge and Gordon, 2008 p. 112)

While many Canadians now live in suburbs, they are in some ways not well represented in the images of the country. Indeed, not a great deal has been written about Canadian suburbs. Recognizing this Coupland (2002, p.107) writes:

> For millions of Canadians, the suburbs are life's main experience, yet their lives are more or less stripped from the history books. The few times suburbanites are ever referenced to is with disdain, and usually in conjunction with environmental degradation, the overbuilding of freeways or extinction. How smug! I mean, those are the people who buy the Kraft products and snow tires and watch the TV shows and listen to the music and… pretty much everything else that runs the nation; they're the bulk of Canadian society, yet history books come to a screaming halt at the well-housed edges of a subdivision, a light-industrial park or a big-box mall. (Coupland 2002, p. 107)

With their growth over the last 60 years, suburbs now represent a significant portion of the people living in Canada and the United States. Today half of all Americans and over a third of all Canadians live in suburbs (England and Mercer 2006, p.25). Further comparing Canada and American suburbs, England and Mercer (2006), note that both have a strong reliance on cars for mobility:

> In a global context, North American cities are enormously dependent on autos and trucks for the movement of goods and people. While this allows great individual mobility and flexibility for road users, massive environmental and infrastructure costs must be born collectively…Nevertheless, the commitment to the car is particularly strong. While Canadians have long been greater users of public transportation than Americans, negotiating the low-density outer city makes the automobile particularly attractive and mass transit particularly costly (and hence in need of substantial subsidy) in both countries (England and Mercer 2006, p.28)

Surrounding the Toronto of the pre-World War Two era are communities, including Mississauga, that have developed along a suburban model, with a high separation of land uses and a strong reliance on cars for mobility. The Regions around the City of Toronto (Peel, Halton, York and Durham – commonly referred to as the '905' due to the telephone exchange, whereas the City of Toronto is '416') now have a population of 3.2 million, exceeding the City of Toronto's 2.6 million (together, the City of Toronto and the surrounding Regions are commonly referred to as the Greater Toronto Area). The Province of Ontario's population projections predict that this difference will grow in the coming years with an even higher proportion of people residing in the suburban Regions (see Table 8 Greater Toronto Area Population - 2006 to 2021) for more details). While the population living in the '905' Regions is generally younger than in the City of Toronto, by 2021, the '905' will have moved closer to having a similar proportion of the population age 65 and older, that the City of Toronto has.

Table 8 - Greater Toronto Area Population Projections (2006 to 2021)

2006

	Age 65+	Total Population	65+ as % of Total Pop.	Land Area (sq.km)	Density – People / sq. km
Peel Region	107,410	1,260,643	8.5%	1,242.40	1,014.7
Halton Region	54,965	456,560	12.0%	967.17	472.1
York Region	95,082	947,482	10.0%	1,761.84	537.8
Durham Region	60,980	585,560	10.4%	2,523.15	232.1
905 Total	318,437	3,250,245	9.8%	6,494.56	500.5
City of Toronto	348,373	2,631,725	13.2%	630.18	4,176.1
Total GTA	666,810	5,881,970	11.3%	7,124.7	825.6

2011

	Age 65+	Total Population	65+ as % of Total Pop.	Land Area (sq.km)	Density – People / sq. km
Peel Region	136,587	1,422,720	9.6%	1,242.40	1,145.1
Halton Region	66,906	514,215	13.0%	967.17	531.7
York Region	121,171	1,093,987	11.1%	1,761.84	620.9
Durham Region	73,619	638,018	11.5%	2,523.15	252.9
905 Total	398,283	3,668,940	10.9%	6,494.56	564.9
City of Toronto	364,068	2,719,972	13.4%	630.18	4,316.2
Total GTA	762,351	6,388,612	11.9%	7,124.7	896.7

2016

	Age 65+	Total Population	65+ as % of Total Pop.	Land Area (sq.km)	Density – People / sq. km
Peel Region	175,717	1,582,865	11.1%	1,242.40	1,274.0
Halton Region	82,210	573,533	14.3%	967.17	593.0
York Region	159,410	1,236,965	12.9%	1,761.84	702.1
Durham Region	92,913	692,933	13.4%	2,523.15	274.6
905 Total	510,250	4,086,296	12.5%	6,494.56	629.2
City of Toronto	405,240	2,825,398	14.3%	630.18	4,483.5
Total GTA	915,490	6,911,694	13.2%	7,124.7	970.1

2021

	Age 65+	Total Population	65+ as % of Total Pop.	Land Area (sq.km)	Density – People / sq. km
Peel Region	217,329	1,726,804	12.6%	1,242.40	1,389.9
Halton Region	99,364	632,037	15.7%	967.17	653.5
York Region	202,034	1,375,639	14.7%	1,761.84	780.8
Durham Region	115,194	748,422	15.4%	2,523.15	296.6
905 Total	633,921	4,482,902	14.1%	6,494.56	690.3
City of Toronto	452,457	2,921,421	15.5%	630.18	4,635.9
Total GTA	1,086,378	7,404,323	14.7%	7,124.7	1,039.2

Population data (existing and projections) is from the Ontario Ministry of Finance.

Municipal land areas are from Statistics Canada 'Community Highlights'.

The City of Mississauga is one of three municipalities within the Regional Municipality of Peel. The other two municipalities within the Regional Municipality of Peel are the City of Brampton and the Town of Caledon.

'905' refers to the telephone area code for the municipalities that surround the City of Toronto and are commonly referred considered part of the Greater Toronto Area. The City of Toronto telephone area code is '416'.

Looking at metropolitan areas in Canada from 1971 to 2001, Hodge (2008) finds generally that suburbs have a lower concentration of people age 65 and older with the inner suburbs having the highest proportion, outside of core cities (see Table 9 - Population Aging in Metropolitan Canada 1971 – 2001). In all likelihood this is related in part to when young families moved into newly developed neighbourhoods and these residents having aged in place. While these neighbourhoods met the needs of young families with cars, they can pose challenges to seniors with difficulties driving. As Hodge and Gordon (2008) note:

> … most suburbs were designed for families with children and with access, almost exclusively, by automobile. Housing tends to be uniform, single-family detached types, and commercial and service clusters are widely separated. Seniors, by comparison, are less mobile (as many as one-quarter, do not have access to an automobile), subject to more physical impairment, and, with increasing age, often require alternative forms of housing. Given their natural desire to continue living in their neighbourhoods they've become accustomed to, suburban seniors face many constraints: stores and doctors' offices are not usually within walking distance, sidewalks might not exist even where transit stops are relatively near, and options for apartment living are rarely available if a spouse should pass on. (Hodge and Gordon 2008, p.394)

Table 9 - Population Aging in Metropolitan Canada 1971 to 2001

Percent Population Age 65+	Suburban Fringe	Outer Suburbs	Inner Suburbs	Core Cities
1971	6.5%	5.4%	6.3%	9.1%
1981	7.2%	6.1%	8.6%	11.1%
1991	8.7%	7.9%	11.3%	12.5%
2001	10.9%			13.2%

Adapted from Hodge 2008, p. 84

Anastakis (2008, p.85) argues that cars have come to represent much of what Canadians see as 'elemental' to their world. England and Mercer (2006) have compared American and Canadian data on modal choice and the journey to work for people living in metropolitan areas, including driving one self, carpooling, use of mass transit and walking. Their findings suggest less Canadians driving by themselves to work and more using mass transit (see Table 10 for more details).

Table 10 - Modal Choice and the Journey to Work: Metropolitan Areas in Canada and the United States

	USA (%) (2002 / 2003)*	Canada (%) (2001)*
Driving Self	80.4	70.8
Carpool	9.2	6.6
Mass Transit	6.17	14.8
Walking	2.6	5.7
All Other	1.7	2.1

Note: * based on Statistics Canada 2001 and American Housing Survey for the US 2002 and 2003 data
Source: England and Mercer 2006

The car is the predominant mode of mobility in Greater Toronto, with the City of Toronto having a lower percentage for cars and a higher percentage for transit than the surrounding suburban communities (see Table 11 – Mode Share of Select Municipalities in Greater Toronto). Relative to other suburban Toronto municipalities, Mississauga has a slightly lower car mode share than other municipalities. In general, the further away a municipality is from Toronto's central business district, the higher the car mode share is.

Table 11 – Mode Share of Select Municipalities in Greater Toronto

Municipality	Auto	Transit	Walk/Cycle
City of Toronto	68%	22%	8%
Town of Whitby	76%	5%	6%
City of Mississauga	84%	8%	5%
Town of Richmond Hill	86%	8%	3%
Town of Markham	87%	7%	4%
City of Vaughan	87%	5%	4%
Town of Oakville	87%	5%	4%
City of Oshawa	88%	4%	6%
Town of Milton	92%	1%	5%

Source: Taylor and Van Nostrand 2008, p.81

The Province of Ontario has a long history of automobile production. The introduction of the Autopact established a common market between the United States and Canada as it relates to automotive production. In 1988 the Canada-United States Free Trade Agreement was established, carrying on the automotive free trade arrangement. This later evolved into the North American Free Trade Agreement with the inclusion of Mexico. In 2005, for the first time, the

province of Ontario passed the state of Michigan as the leading builder of automobiles in North America (Anastakis 2008, p.83). Anastakis (2008) finds that a car culture remains strong in Canada:

> Throughout all these dramatic changes in the industry, Canadians remained loyal to the automobile, if not necessarily the Big Three [auto makers]. For all of the challenges faced after 1973, the car retained its potency as one of society's deepest and most visible influences. From car racing, to highway construction, to the proliferation of different kinds of vehicles (from minivans to SUVs to hybrids), the post-embargo world remained one in which the car still had a prominent place. The pervasive, continuing presence of a roadside automobile culture further illustrated Canadians' attachment to their cars. (Anastakis 2008, pp.83-84) (square brackets added here)

Travelling today across Mississauga by car, or looking at maps, one can see a strong network of highways that include the Queen Elizabeth Way (QEW), the 401, the 403 and the 407. Of course this complex network of highways did not simply come into being one day. Rather, the highway system has come to its present state through many incremental steps from the 1930s onwards. During the 1930s new ideas were coming forward in road design with parkways being developed in New York State and the first autobahn in Germany between Cologne and Bonn. Ontario's then Minister of Highways, Thomas McQuesten, asked his staff to study these examples as part of the design of what would become the Queen Elizabeth Way (Sewell 2009, p.53) Expressing the pride in this initiative, Sewell (2009) states:

> The idea of the new super highway was clearly a matter of great pride for the highway engineers. They noted the following year [1937]: 'In the development of the modern "Divided Highway", Ontario is making a start. This new type of highway not only gives a means of rapid transit over long distances, but provides this with a degree of safety not possible in any other type of Highway development heretofore developed.'…Ontario was clearly on the cutting edge. The first large dual highway to open in the United States was the Pennsylvania Turnpike in 1940… (Sewell 2009 p.53-54) (square brackets added here)

The taking of an existing rural road like Middle Road, running across Toronto Township (now the City of Mississauga) and converting it into a highway had its challenges in terms of restricting existing access points. Traditionally to accommodate more traffic, existing roads had been widened. Now, rather than modifying existing roads into highways, the Ministry of Highways turned to the creation of new highways within newly established corridors that tended to by-pass existing settlement areas (Sewell 2009).

Photo 1 – Queen Elizabeth Way Through Mississauga
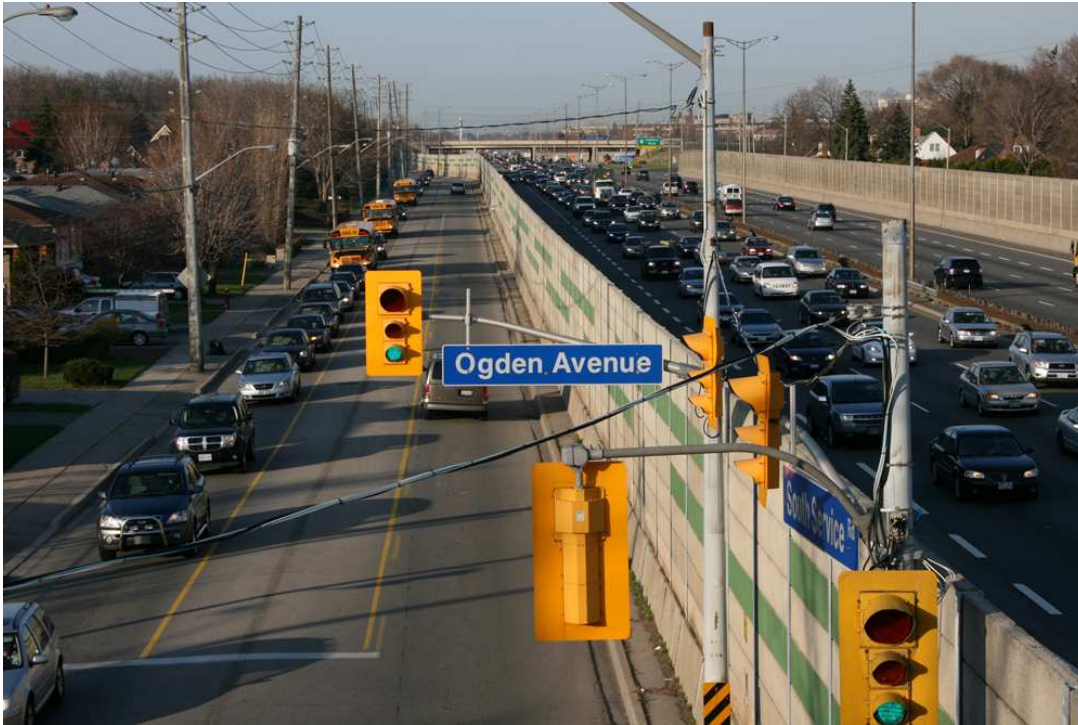
The Queen Elizabeth Way, and its sound walls, is located in the right of this photograph. The left portion of the photo shows a service road along the south side of the highway to serve the residential neighbourhood. A similar service road exists on the north side of the highway. Photo: Christian Fisker

Through the late 1930s and 1940s planning was underway for more highways including the 'Toronto Bypass' (what became Highway 401) and the Toronto-Barrie Highway (what became Highway 400). Construction of Highway 401 (at the time located north of the City of Toronto – now bisecting the city) began in 1949 (Sewell 2009, p.63). Being built in sections it reached westward to Hurontario Street in what was then Toronto Township (now City of Mississauga) in 1957 (Urbaniak 2009, p.251). New highways were now contributing to bringing more jobs and housing to the areas outside the traditional city. In the case of what would become Mississauga:

> The World War II victory parties had barely dispersed when people started arriving in great numbers – returning veterans, young families from the city, even some immigrants from abroad. Their motorcars loaded beyond capacity, they cruised west along the Queen Elizabeth Way, modern and sleek with its arches, boulevards, and distinctive green 'ER' lampposts, the mother of future Canadian expressways and still a worthy tribute to the future Queen Mother who had inaugurated it during that glorious visit of 1939. (Urbaniak 2009, p.25)

In 1959 staff of the Metro Toronto government drafted an Official Plan that showed the newly built Highways 401 and 400 and delineated future routes for Highways 403 (which today travels southwest-northeast across Mississauga), Highway 407 (which today travels east-west across the northern edge of Mississauga and then travels southwards to link up with Highway 403) and

Highway 404 (which today links up with Highway 401 and the Don Valley Parkway and travels northwards from there) (Sewell 2009, p.64). Through the 1960s creating new and expanding existing highways continued. In 1963 Ontario's Minister of Highways, Charles MacNaughton announced that Highway 401, through Toronto, would be expanded into an express and collector system with six lanes in each direction. This would take Highway 401 from its original design of 35,000 cars per day, and 1961 use at 70,000 cars per day, to a new capacity of 164,000 cars per day (Sewell 2009, p.67). Elsewhere in the region work was proceeding on Highway 427 through Etobicoke, linking the Queen Elizabeth Way and Highway 401 (near Pearson International Airport) and the Don Valley Parkway was opened between Lake Ontario and Highway 401. Today Highway 401 runs from Windsor, Ontario, at the border with Detroit, Michigan, at its western limit and travels east to the Ontario-Quebec border, near Montreal. The highway acts as a spine or corridor linking large and small communities and urban and rural communities (Elliott 1986).

Hodge and Gordon (2008, p.124) see a tight relationship between increased automobility, increased roads and changes in community structure. Also recognizing the impact road building has had on the built environment, Sewell (2009) sees roads planning as a powerful tool and hinting that those who hold this power can set in motion a built environment contrary, or conflicting, with those holding the vision of the future built environment for an area:

> Perhaps the most powerful planning tools that exist are the roads, but roads are usually planned and controlled by engineers, not by land-use planners, and they often subvert what the planners had hoped for. In the Toronto area, the construction of the superhighway system was a major influence on the pace, size and scope of urban growth, beginning with the innovative Queen Elizabeth Way in the 1930s. (Sewell 2009, p.50)

The creation of new highways in existing built-up areas of Greater Toronto was beginning to encounter opposition. The Spadina Expressway was a proposed highway that would link up with Highway 401 and weave along a ravine southward into older, established neighbourhoods of Toronto. Ultimately this Metro Toronto initiative was stopped in 1971, by then Premier of Ontario, William Davis, who at the time commented:

> If we are building a transportation system to serve the automobile, the Spadina Expressway would be a good place to start. But if we are building a transportation system to serve people, the Spadina Expressway is a good place to stop. (Sewell 2009, p.68)

Through the 1980s complaints about highway congestion were again coming to the forefront. A 1980s Ontario Ministry of Transportation study estimated that congestion in the Greater Toronto Area was costing the province's commercial and industrial sectors C$2 billion a year in lost

productivity and delayed shipments (Sewell 2009, p.72). In 1986, after taking a helicopter ride to view Greater Toronto's highway congestion in rush hour, then Premier David Peterson announced intentions to proceed with Highway 407, with a ground breaking in 1987 (Sewell 2009, p.72). With less highway capacity, Canadians are somewhat less reliant on highways than Americans. England and Mercer (2006) suggest that the differences can be traced back to the 1940s and 1950s when the U.S. federal government funded highway development while Canadian federal support remained relatively small.

Photo 2 - Highway 401 Through Toronto
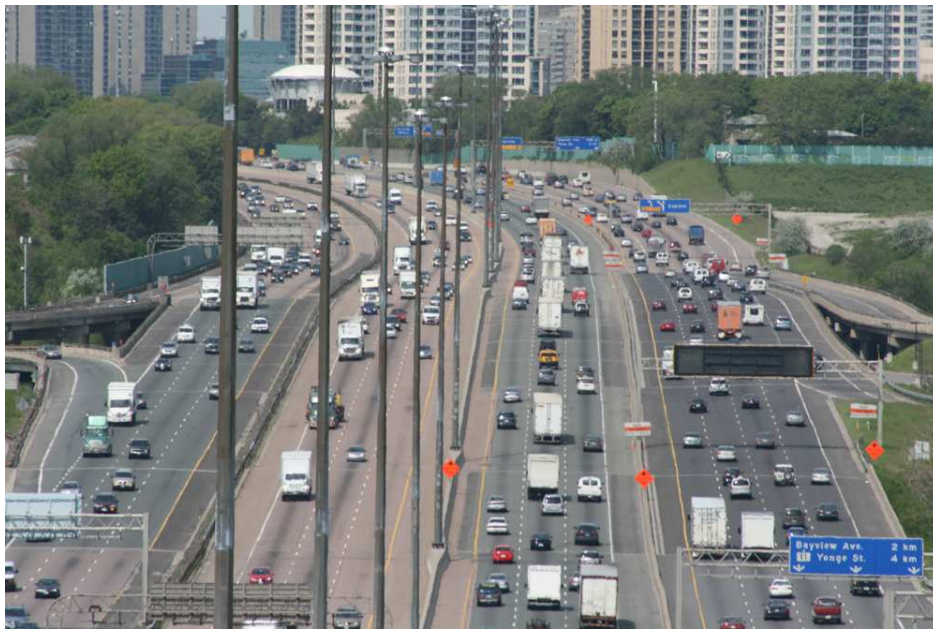
What was originally, in the 1950s, a 4 lane highway to bypass the built-up area of Toronto, now travels through the city with a series of 'core' and 'collector' lanes (with 13 lanes in this photo).   Photo: Christian Fisker

Photo 3 – Highway 403 at Hurontario Street, Mississauga

Highway 403 traverses the middle and western edge of Mississauga. Notice the 'diamond' inner lanes, which are high occupancy vehicle (HOV) lanes where cars must have at least a driver and passenger. Photo: Christian Fisker

Photo 4 – Highway 407, Mississauga

Highway 407 is a toll highway operated by a private organization, through a long-term lease arrangement with the Province of Ontario. Highway 407 travels along the northern and western edges of Mississauga.
Photo: Christian Fisker

Photo 5 – Mississauga City Centre

In the left background is Mississauga city hall and the central library. In the central background is the living arts centre. All three of these buildings have underground parking. To the right is a portion of the large shopping mall known as Square One. Photo: Christian Fisker

Throughout the City of Mississauga there are drive-through coffee shops, banks and other commercial activities. For an extended period of time, the development and use of drive-throughs has not presented itself as an issue and has generally been seen as a convenience. In recent years drive-throughs have drawn political attention for their impact on road safety, pedestrian safety and streetscape. In some instances this has led to design guidelines, such as in the City of Toronto and the City of Mississauga. In some cases the neighbourhood opposition has resulted in drive-through proposed developments being reconfigured or abandoned. In the Region of Waterloo, to the northwest of Mississauga, a staff report to the Region's Community Service Committee states:

> Drive-through facilities reflect an over-emphasis on automobile culture relative to other forms of more healthy transportation. The widespread use and dependence on the automobile has a negative health effect…Drive-throughs encourage "dashboard dining", which results in a driver being distracted and placed at a higher risk for collisions and injury. In addition, pedestrian conflicts with vehicles in drive-through service lanes is an important health and injury consideration and has been a key argument at recent Ontario Municipal Board hearings. (Waterloo 2008, p.2)

A popular coffee and sandwich company, Tim Hortons, operates 1,700 drive-through facilities across Canada, with half of their business taking place at the drive-through windows (Pender 2008). The drive-through phenomenon can also be seen in fundraising efforts by charities. In

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2009 a drive-through event was held in southwest Mississauga to gain signatures on a petition against a proposed electrical power plant (Le 2009). Through 2005 to 2008 City of Mississauga staff consulted with owners and operators of drive-throughs, towards bringing forward design and development guidelines. This builds upon consultations that the city began in 2002 (Mississauga December 2007). As part of the dialogue towards possible guidelines for drive-throughs in the city, in 2008, the Mayor of Mississauga, Hazel McCallion, stated:

> I've always felt we have too many drive-throughs…It's a problem…I don't think we can ban them, but we certainly have to get them under strict control. (Gombu 2008)

At the same time a City Councillor, George Carlson, stated:

> It's not just an environmental issue. It affects the city's culture and streetscapes and is about what kind of city we want to build. (Gombu 2008)

Holding a somewhat contrary view was a provincial association representing restaurants and representatives of companies with existing and proposed drive-throughs. A representative of Tim Hortons stated:

> Every site has its peculiarities…Customers, especially people with mobility problems and families with young children, have repeatedly told the company they appreciate the convenience of drive-throughs. (Gombu 2008)

Photo 6 – Drive-Through Coffee and Sandwich Shop, Mississauga

This coffee shop is located at the intersection of Britannia Road and Hurontario Street in Mississauga. The Mayor of Mississauga has noted the safety hazards of this location. Photo: Christian Fisker

Based on a study of seniors undertaken by the Region of Peel (the regional government for the area that is the City of Mississauga, City of Brampton and Town of Caledon), many use a car (Peel 2003, p.14). This same study finds that 80 per cent of Mississauga seniors, or their spouse, use a car most of the time to get around. The number of people age 80 and older, holding a valid driver's license in Ontario has been increasing over the last decade (see Figure 12 – Percentage of Age 80 and Older Ontarians Holding a Driver's License). From 2001 to 2005, drivers in Ontario age 80 and older had the highest rate of driving improperly among all age groups eligible to be licensed to drive cars, similar to the rate among Ontarians aged 16 to 19. Also from 2001 to 2005, drivers in Ontario age 80 and older had the highest rate of all age groupings, of failing to yield and turning improperly.

Table 12 – Percentage of Age 80 and Older Ontarians Holding a Driver's License

	1996	2005
Male	52%	78%
Female	15%	35%
Total	28%	50%

Source: Ontario Ministry of Transportation, November 2008

Among Canadian seniors age 75 to 84, 83 per cent of men and 45 per cent of women, hold a valid driver's license. Among seniors age 85 and older, 66 per cent of men and 33 per cent of women, in Canada, are able to drive a car (Turcotte 2006).

Programs in place that regulate Ontario senior drivers includes the physician' mandatory reporting program, the 80 and over licence renewal program, the 70 and over collision program. Through Ontario legislation, physicians and optometrists are required to report any condition that may make it dangerous for a person to operate a motor vehicle. Such reports are reviewed by the Ontario Ministry of Transportation to determine the degree of risk, which can lead to an immediate suspension of a driver's license, or a referral to a medical advisory committee, or further evaluation through an individualized assessment of a person's driving ability. As of 2006 police can now also report potentially unfit drivers to the Ontario Ministry of Transportation (Ontario Ministry of Transportation, November 2008). The Canadian Automobile Association (CAA), with 5 million members across the country, has policies regarding senior driving mobility that form part of their ongoing dialogue with province and territories regarding drivers license legislation:

…rather than limiting mobility of aging drivers, solutions must be found that meet the needs of all drivers. CAA supports strategies that include developing an ability-based licensing program, road improvements and education for aging drivers and their family members to help recognize changing abilities and adapt driving practices appropriately. (CAA : www.caasco.com/community/road-safety/older-wiser-drivers.jsp : accessed June 10, 2009)

In the Greater Toronto Area, CAA offers in-car and in-class sessions for seniors who are preparing themselves for mandatory re-testing by the Ontario Ministry of Transportation. CAA suggests six pointers for older drivers, with these being (1) don't be rushed, (2) reduce distractions, (3) stay alert, (4) avoid alcohol, (5) know your medications, and (6) improve visibility. CAA also suggests a variety of adaptive devices that may help seniors retain their driving ability, including visor extenders, steering wheel covers to improve grip, seat and back cushions to relieve pain and improving site lines, larger mirrors, pedal extenders and lifts (CAA : www.caa.ca/agingdrivers/tips/adaptive.html : accessed June 10, 2009)

Across the Region of Peel there is 0.5 passenger vehicles for every person living in the Region. This is the same rate as across the Province of Ontario and higher than the City of Toronto rate of 0.39 passenger vehicles per person (see Table 13 – Licensed Vehicles in Ontario, City of Toronto and Peel Region).

Operating within the specific case study setting of Clarkson-Port Credit is an organization known as the Church Community Volunteers. The group, operating for over 40 years, has representation from eight local churches of different denominations, with one of their key roles being providing volunteer car-driver assistance so seniors can make their medical appointments. This group's Board agreed to provide assistance in gathering some of the participants who could be interviewed for the Clarkson-Port Credit qualitative and quantitative research. This assistance of the Church Community Volunteers is greatly appreciated. Several Board members expressed the challenges that seniors living in the community experience if they can no longer drive a car.

Table 13 - Licensed Vehicles in Ontario, City of Toronto and Peel Region

	Province of Ontario	City of Toronto	Region of Peel
Passenger	6,339,389	1,031,062	641,145
Motorcycle	173,314	15,866	9,975
Moped	1,886	335	103
Commercial	1,287,493	96,633	83,658
Bus	31,743	4,745	2,561
Trailer	2,186,749	132,591	164,994
Snow Vehicle	310,798	8,724	6,981
Off-Road	299,849	6,602	5,375
Total	10,631,221	1,296,558	914,752
Total Population	12,804,521	2,641,926	1,291,343
Passengers Vehicles Per Person	0.5	0.39	0.5

Ontario Ministry of Transportation data (as of December 31, 2007), provided by the Licensing Administration Office of the Ontario Ministry of Transportation, October 16 to 28, 2008
Population figures are 2007 data from Ontario Population Projections, Ontario Ministry of Finance, Spring 2007
The Region of Peel includes the City of Mississauga, the City of Brampton and the Town of Caledon.

In 2008 the percentage of people using public transit in Mississauga was 11 per cent (Mississauga 2009b, p.34). Over recent years Mississauga Transit has been taking steps towards its goal of having a fully-accessible service. While the meaning of a fully-accessible service is not directly defined in Mississauga Transit's Accessibility Plan (2008), the Plan describes an accessibility vision as "To create a fully accessible community utilizing universal design principles resulting in improved attitudes and full inclusion." (Mississauga Transit 2008, p.6) In 2008 Mississauga Transit had 89 regular and 22 school routes, with 27.7 million revenue passenger trips, 1.3 million hours of service and 27.8 million revenue kilometres (Mississauga Transit 2008, p.7). Also in 2008, about 380 of 410 (92%) of fleet vehicles are low floor accessible buses (Mississauga Transit 2008, p.7). Of the city's 22 terminals and transit hubs, 19 (86%) are considered fully accessible (Mississauga Transit 2008, p.7). In order for Mississauga Transit to consider its bus routes as being fully accessible (a) buses along a route must be fully accessible, with low floors, and (b) transit infrastructure along a route must be installed at every stop, if feasible, and must connect with the existing sidewalk network. There are locations in the city where bus stops are adjacent to areas where there is only grass, with no pad and no sidewalks. In 2008 Mississauga Transit considered 31 of its 89 regular routes to be fully accessible (Mississauga Transit 2008, p.9). In 2007 Mississauga Transit introduced a personal care attendant policy on a half year trial basis, with this becoming a permanent policy in 2008. With this policy in place personal care attendants of a transit rider, who has disabilities, can ride the system at no charge (Mississauga Transit 2008, p.10). In addition to the Mississauga Transit

system, the Region of Peel operates a public transportation system known as TransHelp. The TransHelp system is designed for residents of the City of Mississauga, City of Brampton and the Town of Caledon, who use a wheelchair or a scooter and are unable to board transit vehicles at the local-tier level. TransHelp serves about 5,000 people and in 2008 provided 290,000 rides, representing an average of 60 rides per customer (Erin Research 2008). The service is provided by Peel Region owned buses and local taxi companies contracted to the Region of Peel. Typically riders of TransHelp are required to book their travel a day in advance of their planned travel.

Beyond bringing existing routes towards a fully accessible standard, the city, together with the provincial and federal governments, is working on new proposed transit lines, with one being an east-west bus rapid transit route, and the other being a north-south route along Hurontario Street. The east-west bus rapid transit route will run 18 kilometres, the full span of the city, and include 12 stations. The eastern portion of the route will run into the City of Toronto and have links to Pearson International Airport in northeast Mississauga (Mississauga Transit 2008, p.13). The north-south route is proposed to run from Port Credit, near Lake Ontario, north through Mississauga's city centre and then further north into the City of Brampton. Whether this route will be a bus system or light rail system has yet to be determined (Mississauga, Brampton, MMM Group 2008).

Within the City of Mississauga's new (2009a) Action Plan, tied to its new Strategic Plan, it is proposed that areas of the city be designated as older-adult clusters in mixed-use areas:

> Many older adults depend on convenient access to goods, services and amenities. Unfortunately, this segment of the population often lives in neighbourhoods where use of an automobile is necessary. We will introduce a new policy framework to ensure that retirement centres and senior apartment developments are located in nodes and corridors near a wide variety of services, programs, transit, amenities and conveniences. Older adults will enjoy greater independence and a higher quality of life if they reside in mixed-use areas and urban corridors of the city, which offer everyday necessities of life within a short walk. (Mississauga 2009a, p.21)

At the same time the city plans to work with the Region of Peel and other service providers to make efforts to ensure that seniors can remain in their existing homes for as long as possible (Mississauga 2009a, p.22).

Few Ontario doctors make house calls.   Dr. Nowaczynski, an Assistant Professor at the University of Toronto's Department of Family and Community Medicine, is a rare example of a

doctor who makes housecalls in Ontario. Nowaczynski was part of a National Film board of Canada film 'House Calls' which examined the lives of housebound seniors and their struggles to maintain independence. Nowaczynski, as noted here in an article by Kermode-Scott (2007), finds that:

> When we are old we become invisible. We lose our health. We lose our mobility. We lose our independence. We are institutionalized or become house-bound and retreat into our homes, disappearing into a forgotten and hidden world. (Kermode-Scott 2007)

By 1980 less than one percent of doctors made house calls. According to Dr. Nowaczynski, some of the factors that have led to a significant drop in house calls includes the centralization of medical care, training and delivery in general hospitals and the Ontario Health Insurance Plan (OHIP) funding formula (UToronto Medicine, April 2006). In Dr. Nowaczynski's own words:

> In a fee for service world, it makes absolutely no sense to go to the patient from a business point of view…A plumber is paid more to make a house call than a doctor is. (UToronto Medicine April 2006, p.12)

Dr. Nowaczynski is of the view that it makes good economic sense to support the elderly at home:

> With so many of my patients, $20 a day of home care is all they need to manage at home…Compare that to $110, the daily subsidy for long-term care facilities. Why shouldn't you spend $20 to save $110? (UToronto Medicine April 2006, p.13)

In 2007 Ontario's Ministry of Health and Long-Term Care announced an 'Aging at Home Strategy' which flows funding to the province's 14 local health integrated networks towards keeping seniors in their own homes longer. Each local health integrated network has been provided with flexibility on how to use this additional funding through additional home care, assistive devices and in some instances additional long-term care spaces. In describing the strategy the province states:

> Most seniors want to continue living at home, whether it is a private home, condominium complex, an apartment or other living arrangements. *The Aging at Home Strategy* will work towards matching the needs of seniors and their caregivers with the appropriate local support services and avoid the unnecessary loss of independence and dignity due to premature admission to higher care long-term care homes or hospitals. The *Aging at Home Strategy* is of critical importance, both for its potential to improve the lives of Ontario seniors, and also because it will help ensure the sustainability of the overall health care system. (Ontario Ministry of Health and Long-Term Care, Aging at Home: Questions and Answers, 2007) (italics from original document)

By making reference to 'sustainability of the overall health care system' they appear to be gently stating that additional home care will keep some seniors, with needs that can be addressed in their own homes, away from blocking hospital beds that could be utilized for other purposes (for more background see Baranek, Deber, Williams 2004). From this perspective the Aging at Home Strategy can be seen as a way to ensuring accessibility in the hospital setting for patients with shorter term immobility, by encouraging those with more predominant immobility to stay in their own homes.

The Mississauga Halton Local Health Integrated Network, which serves Mississauga and the Region to the west, is coordinating home based services for 11,934 people age 65 and older. At the same time the Mississauga Halton Local Health Integrated Network provides 22,222 telephone visits and 47,034 face-to-face visits with people age 65 and older (Ontario Ministry of Health and Long-Term Care 2008). This data does not include those who may be acquiring home care services privately, outside of the provincial system, or those who may be acquiring electronic monitoring through private emergency response systems. Ontario's home care program and the Aging at Home Strategy are examples of the state coordinating services, that are brought to relatively immobile individuals, as a means of keeping them in their current housing. Here we see an example of the mobilities of those who can be mobile, being altered through their relationship with those who are immobile, in terms of addressing their needs.

In 2003 the Region of Peel commissioned a study that explores where seniors live. Study participants were asked when they plan to move, with a large percentage of the Mississauga participants stating that they don't plan to move (29.7%) or that they don't know, or, are not sure (26.8%) (Peel 2003, p.32) Among factors to be considered in selecting a new place to live, being close to doctors and hospitals ranked high among all participants and as very important to 63.2 per cent of all of the Mississauga participants. Other factors considered, that had varying degrees of importance, were being close to recreational and social programs and activities, being close to shopping facilities, being close to public transportation, and being close to friends and family. Among Mississauga participants, the study finds that 42 per cent had households where someone age 55 or older needed assistance with shopping.

Among the housing choices available to immobile seniors in Mississauga, who choose to leave their traditional homes, is retirement homes and long-term care homes. Retirement homes are operated predominantly by private organizations and tend to cater to seniors with needs not as care focused as in long-term care homes. In Mississauga there are 1,945 retirement home spaces (see Table 14 – Retirement Homes in Mississauga, Peel, Greater Toronto and Ontario). Long-term care homes are regulated by the Ontario Ministry of Health and Long-Term Care and

cater to the needs of frail seniors. These long-term care homes are run by a mix of private, non-profit and regional government organizations. There are 15 long-term care homes in Mississauga, serving the needs of 2,439 residents, representing 8.8 per cent of the age 75 and older population (see Table 15 – Long-Term Care Homes in Mississauga). With both retirement homes and long-term care homes, resident needs, including food and social activities and care, are catered to on site through staff who work in the homes. At the same time, family and friends can visit in a retirement home or long-term care home. Together with the staff of these homes, plus delivery of specialists, food and other items, we can see the needs of immobilites being sustained by the mobility of others.

Table 14 - Retirement Homes in Mississauga, Peel, Greater Toronto and Ontario

	Retirement Home Spaces	Retirement Homes	Total Residents	Capture Rate Among Age 75+ Population
Mississauga	1,945	20	--	--
Peel	2,021	25	1,972	4.0%
Greater Toronto	12,109	148	11,214	3.3%
Ontario	42,120	670	39,014	4.8%

Source: Peel, Greater Toronto and Ontario data is from Canada Mortgage and Housing Corporation, 2008, Retirement Homes Report – 2008; Mississauga data is unpublished data provided by the Ontario Market Analysis Centre, Canada Mortgage and Housing Corporation

Table 15 - Long-Term Care Homes in Mississauga

Long-Term Care Home	Beds/Residents
Cawthra Gardens Long Term Care Community	192
Erin Mills Lodge Nursing Home	86
Extendicare Mississauga	140
Leisureworld Caregiving Centre – Mississauga	237
Leisureworld Caregiving Centre – Streetsville	118
Malton Village Long Term Care Centre	160
Mississauga Lifecare Centre	203
Mississauga Long Term Care Facility	55
Sheridan Villa	236
Specialty Care Mississauga Road	160
Tyndall Nursing Home	151
Villa Forum	160
The Village of Erin Meadows	180
The Wenleigh	161
Yee Hong Centre - Mississauga	200
Total	2,439
	Capture Rate Among Age 75+ Population: 8.8%

Source: Ontario Ministry of Health and Long-Term Care, Public Reporting web site, http://publicreporting.ltchomes.net, accessed May 6, 2009; the capture rate was produced based on a Statistics Canada, 2006 Community Profiles web site data, www.statcan.gc.ca

Overall, Mississauga is a relatively young community, with major population and mobility infrastructure growth, in the form of roads and highways taking place from the 1970s onwards. The city is situated in a larger setting where considerable highway development and car manufacturing takes place. Mississauga's population, having previously been relatively young, is now aging in a setting that has given precedence to cars and roads over other forms of mobility technology and mobility infrastructures.

Climate wise, the Greater Toronto Area is mid-continent and moderated by the Great Lakes, resulting in a high mean temperature of 22 degrees Celsius in July and a low mean temperature of -4 degrees Celsius in January (Environment Canada on-line data).

Photo 7 – Shopping Centre, Clarkson

This shopping centre was a prominent connection among some of the Clarkson-Port Credit participants. On the left is a grocery store that is open 24 hours a day and on the right is a popular pharmacy. This photo does not show the additional parking to the left, right and behind this view. Photo: Christian Fisker

Photo 8 – Residential Neighbourhood, Clarkson

This image shows a residential neighbourhood in Clarkson. The homes typically have one or two car garages. Notice there is a sidewalk on both sides of the road. A short walk from here is a main road where there are bus routes. Photo: Christian Fisker

Figure 14 – City of Mississauga within the Greater Toronto Area
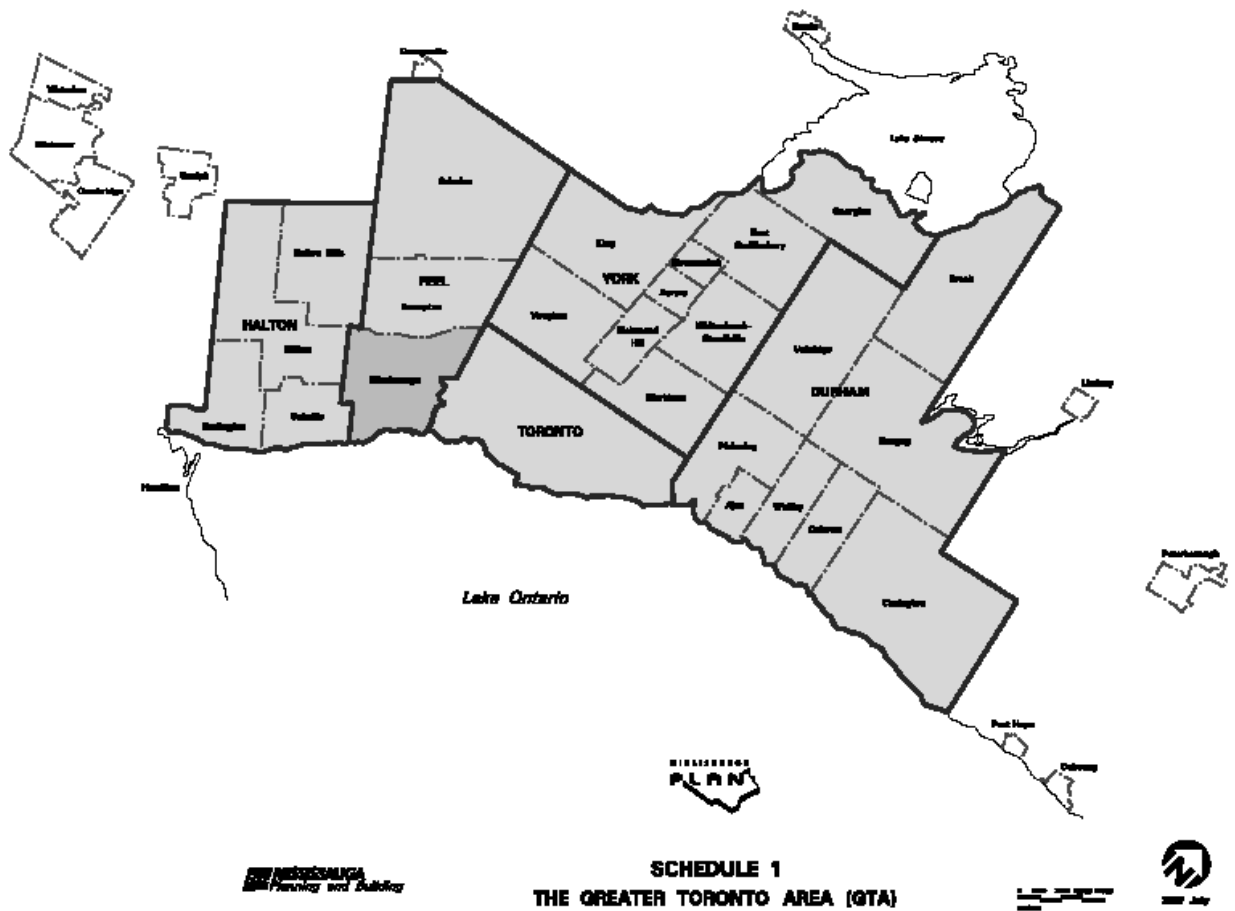
Source: City of Mississauga Official Plan

Figure 15 – City of Mississauga, 2009
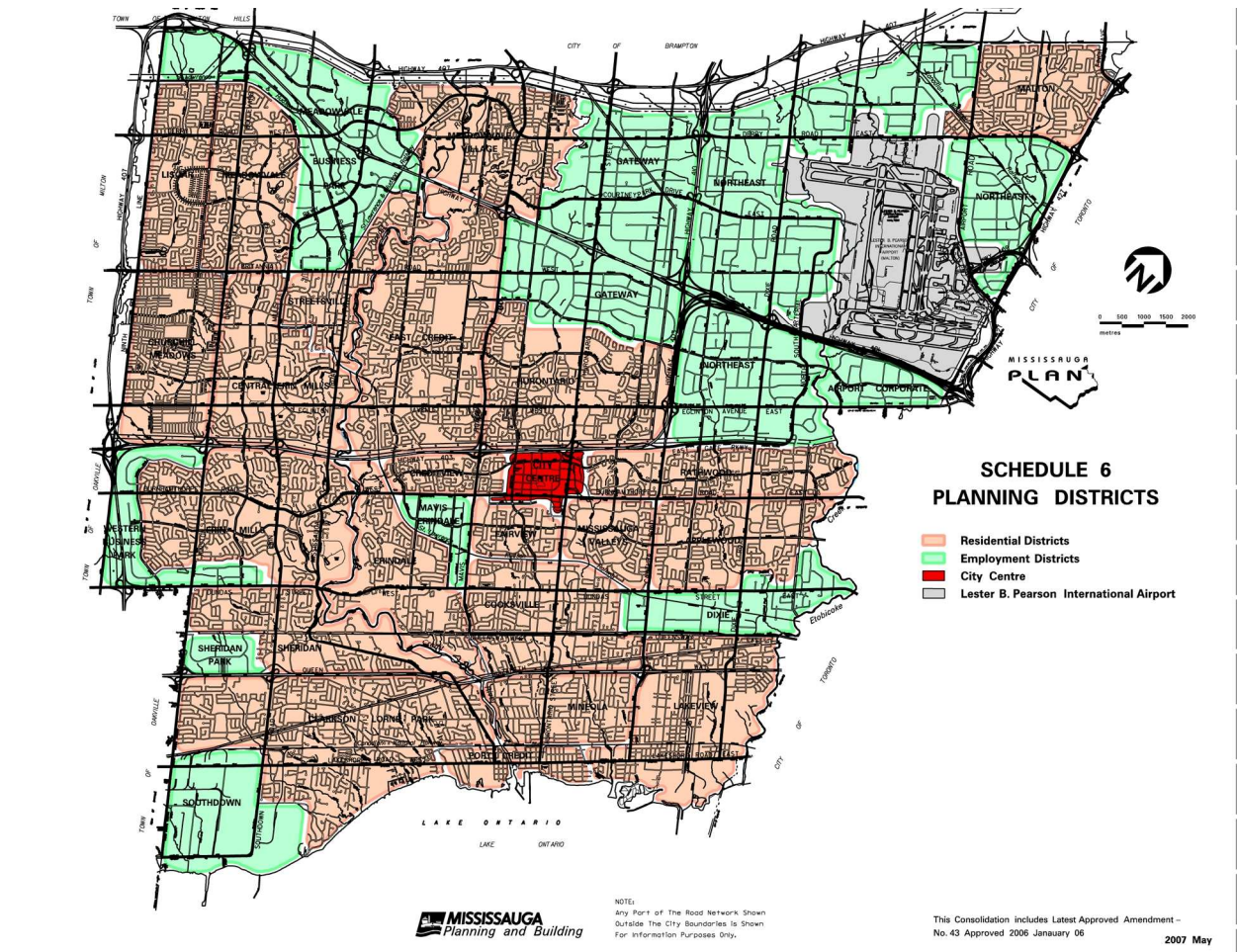
Source: Custom image produced courtesy of the City of Mississauga Geomatics Section

Notice the roads already laid out by 1877 have become a grid of major east-west and north-south roads in the City of Mississauga. Additional major roads have been interwoven between the original road allowances. A network of local residential roads, many 'curvy' and cul-de-sacs, have also been introduced. Also notice the coarseness of the mix of land uses in terms of how the City of Mississauga delineates different planning districts. The specific case study setting in Mississauga is the area described as Clarkson and Port Credit, in the southwest area of this image.

The Danish Setting – Aarhus, Denmark

Presented here is the empirical research of the Aarhus, Denmark case study setting. In gathering data for this empirical research, a number of key informants provided useful information and context. A face-to-face meeting and follow-up email discussions took place with Tom Nielsen, Professor, Aarhus School of Architecture. This was helpful in terms of building up a general picture of the current built environment in Aarhus, infrastructure projects being considered, and areas of the city experiencing suburban residential and retail-commercial development. A face-to-face meeting and emails pre and post this meeting, took place with Tove Jørvang, Chair of the Aarhus committee of Ældre Sagen, the Danish seniors' association. These discussions helped build up a general understanding of the life of seniors in Aarhus, mobility challenges seniors raise within the organization and the role Ældre Sagen plays in offering driving refresher courses for seniors. Specific to the case study setting of Vejlby-Risskov, there were face-to-face meetings and email discussions with several people. Hanne Børresen lives in Vejlby and also works there as a nurse serving the needs of seniors. Through our discussions I gained insight into the lives of seniors who attend and participate in events at the seniors' centre in Vejlby, that offers seniors' social, wellness and health programs. Shelley Smith is an Associate Professor in the Department of Architecture, Design and Mediatechnology at Aalborg University. Ms. Smith, originally from Ontario, Canada, is a resident of the Risskov area and has lived in Denmark for over 20 years. Through our discussions I was able to build up an understanding of some of the more subtle cultural differences between the two case study settings, from the perspective of someone who quickly knew what I meant when I would say 'is it kind of like what's called xxx in Ontario?' and other inquiries of this sort, of translation of terms and practices. As will be noted in the qualitative research discussion, Ms. Smith provided translation and transcription of the Danish interviews into English. For this I am very grateful.

The City of Aarhus, located centrally on the eastern side of the peninsula of Jutland, is the largest city in Jutland and the second largest city in Denmark. Denmark can trace its human settlements over an extended period of time. Jensen (1982, p.6) notes that there has been 10,000 years of continuous settlement in southern Scandinavia and that what is present day Denmark served as a bridge between central Europe and the Scandinavian peninsula. Randsborg (2009, p.22) has mapped the location of burial mounds from the early bronze age, which can be used to trace out the road network of this time period. Further, Randsborg (2009, pp.21-22) informs us that this time period saw the introduction of two-wheeled horse drawn carts, similar to those of the bronze age in Greece. During the Viking age Aarhus was a small community along the Aarhus River (www.visitaarhus.com). Denmark experienced its first wave of urbanization from 1000 to 1200, when 17 towns were established in the Kingdom (Christensen and Mikkelsen 2008, p.16). In a

second wave, from 1200 to 1350 at least 57 new market towns were established, with a stronger relationship to the coastline than in the first wave. In his research of the 'natural market town system', Christensen (2008, p.47) draws attention to a map produced by historian Vilhelm Lorenzen in 1947, showing the location of towns from 1200 to 1800 and delineating a 15 kilometre radius around each, as this is considered the area of resources by which a town is maintained. This distance is considered the average maximum return distance in one day for a peasant with a wagon. In essence this sets out an understanding of the connections made possible by the mobility technology (the wagon) and mobility infrastructure (the roads) of the day. On this map one can see Aarhus and Skanderborg having overlapping 15 kilometre radius circles. By 1672 Aarhus had a population of 3,474 people, making it slightly smaller than Aalborg, Elsinore and Odense at that time (Degn 2008, p.99). By 1787 Aarhus had a population of 4,052 and by 1801 the population was 4,102 (Petersen 2008, p.186).

Christensen and Mikkelsen (2008, p.15) note that the long Danish coastline gave communities shipping connections to other parts of the country and abroad. Due to natural geography, from 1429 to the 1800s, Denmark was able to collect Sound Dues from ships entering and exiting the Baltic Sea. Jespersen (2004, pp.116-117) notes that this turned the Øresund into a 'veritable gold mine' for the Danish King. Through the 1800s scheduled passenger ships began to connect areas of the country into an 'integrated transport system' (Jespersen 2004, p.147). In 1819 a route was established between Copenhagen and Kiel. In 1828 a route from Korsør to Nyborg, across the Great Belt, was established. In 1834 a new route established a link between Zealand and Aarhus (Jespersen 2004, p.148). While early roads were in place, the relationship and connection of communities across the sea and other watercourses was prevalent. Rindel (2002) notes:

> …that the major watercourses became of increasing importance as a means of frequent communication and transportation of goods during the Late Iron Age and Early Middle Age. Such changes in the relation between the settlement patterns and the watercourses would be in good line with the establishment of numerous landing places at the coasts in this period. (Rindel 2002, p.190)

According to Christensen (2008, p.88), the speed of travel across roads remained fairly constant until the later part of the 18th century. Roads were in poor condition compared to later time periods, and formed an obstacle to trade. From the 1700s to the 1860s a network of roads was built across Denmark. Møller (2008, pp.240-241) finds that through the 1700s road conditions left much to be desired and that in many cases sea transport was easier and cheaper. Through the late 1800s the road network was greatly expanded, with main roads converted to 'highways' that could support heavy traffic (Jespersen 2004, p.147).

The first railway line in what is present day Denmark came into use in 1847, running from Roskilde to Copenhagen and shortly thereafter extended southwest to Korsør (Jespersen 2004, p.147). Within 30 years of this first railway line opening, the basic framework of the rail network across Denmark was in use (Jespersen 2004, p.147). In 1874 it was possible to take a train from Copenhagen to Frederikshavn in northern Jutland, or Esbjerg on the west coast of Jutland, travelling at the 'awesome' speed of 30 kilometres per hour (Jespersen 2004, p.147, see also Christensen 2008, p.87). From 1847 to 1861 there was significant growth of the harbour area in Aarhus, which coincides with the introduction of a railway line from Aarhus to Randers (www.visitaarhus.com).

Cars have been a part of Danish life from the very early days of this mobility technology. Already in 1907 a Danish company was selling Ford Model Ts (Wagner, January 2009). During World War 1 gasoline was rationed, which slowed the introduction of cars. In 1919 a Ford assembly plant opened in Copenhagen, followed by a General Motors factory in 1923. By 1923 Ford had a new larger plant in Copenhagen. In its early days Danish car culture was based on leisure consumption (Cassamagnaghi, Moretto, Wagner, May 2010). Wagner (September 2009, p.3) argues that following World War 2, what he refers to as 'automobilism' was hampered by harsh economic restrictions, which were lifted gradually through the 1950s. By 1939 there were 109,000 privately owned cars in Denmark, and it went down to 105,000 in 1949. From 1952 to 1957 restrictions were gradually reduced and '…the popular mass culture of automobiles got well underway.' (Cassamagnaghi, Moretto, Wagner, May 2010, p.10) From 184,000 private cars in 1954 the number rose significantly to 731,000 private cars by 1964. By 1973 there was 1,232,000 private cars in Denmark (Wagner, September 2009, p.15).

According to Wagner (September 2009, p.3), with the growth of suburbs in the 1960s, the early on appropriation of the car by touring, lost its momentum to the 'practical need' to have a car in order to survive in everyday life. Overtime this refocus from leisure to practical need to use a car transitioned through the 1970s. As Cassamagnaghi, Moretto and Wagner (May 2010) describe it:

> The turning point for this popular mass culture of leisure appeared when the dependency of the automobile for practical every day purposes overruled the leisure regime of the automobile. This happened during the 1970ies. The Danish automobile culture was finally Americanized and this brought the nation wholeheartedly into the age of the automobile. Today the average Danish family would find it extremely hard to live a normal life with the daily routines without one or several automobiles. As a consequence of this the appropriation of the automobile in Denmark is now primarily for practical purposes (Cassamagnaghi, Moretto, Wagner, May 2010, pp.11-12)

Jensen (1982, p.3) sees the 1960s and the 1970s as a boom period for Danish cities and growth of the motorway network. While car culture was catching on, the trend towards suburbanization was happening:

> During the 1970ies the suburban housing areas mushroomed and more people began to commute to work by car. At the same time the process of decentring the industry and commercial activities relocating production and consumption outside the cities turned the automobile into a practical necessity in Danish society. Automobilism had come to a decisive turning point where the appropriation of the family car for practical mobility in everyday life gained more importance than the appropriation of the automobile for leisure purposes. (Wagner, September 2009, p.17)

Describing some of the changes taking place from 1950 to 2000, through the creation of motorways, increased car use and a suburban built environment, Randsborg (2009) notes:

> In the countryside, buildings reminiscent of 'old times' are transformed into week-end homes, parts of suburbia or new 'towns' along motorways where transport companies, warehouses and some manufacturing industries cluster, thus transforming century-old settlement patterns. Suburban society expanded dramatically with the new-found wealth of the 1950s; whole neighbourhoods sprang up in egalitarian style with identical-sized homes, and most households soon had a car of their own. (Randsborg 2009, p.101)

In 1961 car traffic in Denmark consisted of 354,000 passenger cars. Now the figure is above 2 million (Statistics Denmark 2009, p.21). The average Dane travels 13,600 kilometres per year with 85 per cent of this distance covered by cars and vans, with trains and buses being the second and third most typical forms of transport. Three per cent of all passenger transport is covered by bicycles or mopeds and 1 per cent by motorcycle (Statistics Denmark 2009).

Ransborg (2009, p.107) argues that communication has greatly improved with the new motorways and bridges, including over the Great Belt (Store Bælt) in the 1990s and Øresund in 2000. If we look to the not so distant past we can see how these mobility infrastructures evolved and have heightened connections. Hovegesen and Nielsen (2005, p.1) argue that Denmark has a motorway network that has been developed from numerous ad hoc decisions on individual road segments. Work commenced on Denmark's first motorway in 1938, north of Copenhagen. Due to the Second World War and a shortage of materials, this first section did not open until 1956. Shortly thereafter a number of motorways were developed to by-pass communities such as Lyngby and Randers, and as approaches to new ferry berths at the Great Belt crossing (Hovgesen and Nielsen 2005). Through the 1960s the design and development of a Jutland motorway was discussed and debated. This early design is similar to the network that is now in place. Hovgesen and Nielsen (2005, p.3) argue that there is a growing concentration of

population and workplaces on the east coast of Jutland, which is generally where the motorway running north-south in Jutland is located. Viewing the motorway network on a national map, it resembles the letter 'H', which is reflected in the network's nickname as 'Det Store H' (the big H). At times, the routing of new Danish motorways has been contested, such as the proposed alignment near Silkeborg (Figueroa 2005). Comparing settlement patterns and the motorway network from 1982 to 2002, Hovgesen and Nielsen (2005, p.5) see corridors 'reaching out to', or overlapping the largest urban centres and that this is particularly visible in the Randers-Aarhus-Horsens-Vejle corridor. In 2004, Danish motorways made up only 1.4 per cent of the total road network, by length, yet handles 22 per cent of all traffic activity (Hovgesen and Nielsen 2005). The motorway between Aarhus and Aalborg can trace its beginnings to design work in the 1970s, with construction commencing in the 1980s and opening in the 1990s (Nielsen and Hovgesen 2005, p.15). As of 2009 Denmark has a total road network that consists of 1,128 kilometres of motorways, 379 kilometres of dual carriageways and 71,824 kilometres of other roads (Statistics Denmark, March 2010, p.4). This represents a doubling of the length of motorways from 20 years earlier (Nielsen and Hovgesen 2005).

In comparing satellite photos of the city from 1954 and 2009 (thank you to Peter Schack Madsen of Aarhus Kommune for providing these images) one can see the significant levels of settlement and infrastructure growth across the region. On the 1954 image one can see the original ring road created in the 1930s. On the 2009 image, and mapping in *Vejnavnrkort* (2005) produced by Aarhus Kommune, one can see the outwardly expanded settlement areas, the second ring road and southern ring road, built in the 1980s, wrapping around the inner city, and the motorways by-passing (E45) and probing into the city (Aarhus South Motorway, Motorway 15 coming eastward from Silkeborg into Braband and the Djursland Motorway (15) in the northern part of the city). All considered together, one sees the infrastructure that enables car use has grown significantly.

Kjær (2004, p.1) states that in Denmark elderly drivers are the fastest growing segment of the driving population. As of 2004 (Kjær, p.3) Danish legislation allowed driver's licenses at age 18 and requires renewal every fourth year after age 70 (Fildes et al 2008). As of 2008 driver's license renewal of Danes occurs first at age 70. By age 80 Danes must renew their license every year. In research of Danish municipalities, it was found that very few have taken steps to address the needs of senior drivers, with most responding that they are not doing anything to address elderly drivers. One action taken by some municipalities is supporting a refresher course of driving skills (Kjær 2004, p.4).

Ældre Sagen (Dane Age Association) is an association representing over 500,000 seniors in Denmark, representing 27 per cent of all Danes age 50 and older. Through its international links

the association is a part of the American Association of Retired Persons' Global Network. Ældre Sagen notes that in Denmark there is typically 5 weeks paid vacation time and 37 hour work weeks and that this creates a national environment where there is a positive balance between work and family life. Further, they note that combined with limited geographic distances within Denmark, this '…enables families to have a greater involvement with their older family members – at least theoretically.' (Ældre Sagen 2007, p.3) The Association's regional committees and volunteers report that the reorganization and centralization of local government has resulted in some areas lacking in transportation support for seniors. Some local committees advocate for '…decent transportation opportunities for people who are too weak to drive their own car or do not own one, as a number of local governments after the reorganization have cut back on public transportation services.' (Ældre Sagen 2007, pp.13-14) Some committees, including in the Aarhus area, also run driver refresher courses (Ældre Sagen 2007, p.20). Based on discussions with the committee in Aarhus, their refresher courses take place once a year and seniors preferably use their own cars as part of the course.

Jensen (2007c) argues that the bicycle is predominantly visible as part of Danish mobility culture, where it is a mobility technology given an almost invisible status, like other technological givens, like forks and knives. Jensen (2007c) further states that there is an almost taken for granted understanding of bicycles and their mobility potential, which is grounded in early childhood. Separated bicycle paths can be seen across Aarhus and within the Vejlby-Risskov area. These paths are actively used by all age groups, with many users having cargo capabilities on their bicycles.

In a recent news item on www.danskekommuner.dk (May 24, 2011), Mads Brandsen describes a new initiative being undertaken by the municipalities of Aalborg, Albertslund, Frederiksværk, Horsens and Ringe to create 'the city for life', to ensure urban spaces are designed to promote an active lifestyle for seniors and others (thank you to Peter Kirkegaard for providing translation of this material). Based on conversations with key informants, an initiative of this sort is not active in Aarhus.

Photo 9 - Highway, Aarhus

This is the N15, southwest of the central part of Aarhus. Motorways now wrap around the city, further out from where the second ring road is situated. Photo: Christian Fisker

Photo 10 - Second Ring Road, Aarhus

This second ring road, built during the 1980s, encircles the older neighbourhoods of Aarhus. On both sides of this road are separate paths for bicycles. Photo: Christian Fisker

Photo 11 - Veri Center, Vejlby

Photo 12 – Veri Center Signage, Vejlby

Veri Center in Vejlby is a shopping centre that is mentioned by the participants. The centre has parking for cars on both sides of the building. There is also parking for bicycles. Photos: Christian Fisker

Photo 13 - Residential Neighbourhood, Vejlby

This is a residential area in Vejlby. In this area, the local streets do not have sidewalks. Where this road connects with a collector road in the community, there are sidewalks and a bus route. Photo: Christian Fisker

Wagner (September 2009, p.19) argues that today the average Danish family would find it extremely difficult to live a 'normal life', with 'daily routines', without one or more cars. Yet, at the same time, about 30 per cent of Danish households do not have access to a car, and their everyday connections are being maintained in other ways. Today about 300,000 people live in the City of Aarhus. With a land area of 468 square kilometres, this represents a density of 637 people per square kilometre. The city's population has grown by about 1 per cent per year since the 1950s, with some predicting a population growth of about 100,000 people by 2030. As of 2007, the City of Aarhus is part of the Region of Central Jutland (Region Midtjylland), with an area of 13,053 square kilometres and a population of 1,237,041 (2008). Today, Aarhus has a higher proportion of seniors than Mississauga, as seen in the data described in Table 16.

Table 16 – Aarhus Elderly Population, 2007

Age Group	Population	Per Cent of Total Population
Age 65+	35,170	12.1%
Age 75+	16,851	5.7%
Age 85+	4,863	1.6%
Total Population	296,170	

Statistics Denmark on-line data - 2007

In places along major roads, including in the specific case study setting, bicycle pathways exist. They can also be found separated from roads and car traffic. These paths offer a prominent mobility option, when compared to the bicycle path opportunities in Mississauga. When compared to Mississauga, Aarhus has traditionally had more mixed uses in closer proximity. This is most apparent in the older established parts of the city. This higher degree of mixed use, or finer grain, may contribute to more walking, cycling and public transit use. Newer development areas, such as Tilst, include a McDonald's with a drive-through and 'big box' retail development. Yet, even in these outer suburban areas, bicycle use is visible and bicycle parking can be seen at workplaces.

The terrain of the city can best be described as gently hilly, with the low areas being by the sea and waterways leading to the sea. Climate wise, Denmark experiences a northern European climate that is moderated by the North Sea. The average low temperature in January is 0 degrees Celsius and the high is 16 degrees Celsius in August (Statistics Denmark on-line data).

Figure 16 – Aarhus Kommune

Source: Aarhus Kommune
The specific case study setting in Aarhus is the area described as Vejlby and Risskov, north of the city centre.

There are similarities and differences between the two case study settings. Generally, we can consider these from a built environment perspective and a general mobilities culture perspective. Both specific case study settings are relatively low density when compared to the city centres in both communities. Both specific case study settings are some distance away from their nearest city centre. Both specific case study settings have nodes (Lynch 1960) along or near major road intersections, where clusters of high density residential and uses that service the needs of the community, such as grocery stores, can be found. Both specific case study settings are established neighbourhoods and have a mix of older and newer housing. Both specific case study settings have significant parkland areas and waterfronts.

From a roads perspective, both specific case study settings have several key roads, open to four lanes of traffic, which serve as vehicular collectors for surrounding neighbourhoods and have regular bus routes. In the Vejlby-Risskov area there is a high presence of bicycle paths along major roads, when compared to the Clarkson-Port Credit area. One can see a greater number of bicycles in use in the Vejlby-Risskov area, than in the Clarkson-Port Credit area, in terms of visually seeing bicycles in use on pathways and roads and the number of bicycles parked outside grocery stores, banks and other places. In terms of spaces for car parking, there are few places in the Vejlby-Risskov area that provide for as much car parking as places in Clarkson-Port Credit. The one exception of sorts is the Veri Center in Vejlby. It is mentioned here more for its scale of parking compared to other places in Vejlby-Risskov than the larger parking areas found in Clarkson-Port Credit. In Clarkson-Port Credit, these larger parking areas seem to have design precedent over creating pedestrian friendly access paths to shopping areas. Rarely are bicycles seen parked at the Clarkson-Port Credit shopping areas.

At a more general setting scale, in Mississauga we see a fairly rigid grid of main roads that existed before the other roads now around them. In Aarhus we see an area built before 1930 or so, having a rather rambly network of what in today's terms could be considered narrow roads. Subsequent to this era, ring roads have been built, framing the newer neighbourhoods.

From a mobilities cultural perspective, both settings appear to have built up a strong acceptance of automobility over time. In Canada, this acceptance came earlier, including the development of highways at an earlier stage than in Denmark. While this is the case, automobility does not appear to be as closely aligned to the notion of a mono-culture of automobility, in Denmark, when compared to Canada.

4.2   Qualitative Research

As noted earlier, nine seniors were interviewed in each of the two specific case study settings. In each setting three participants are active car drivers, three participants no longer drive a car and live in their traditional homes and three participants no longer drive a car and live in a relatively new home setting. Finding seniors who are active car drivers who could be interviewed proved to be relatively easy, with names being suggested through key informants, friends and relatives. Finding seniors who no longer drive a car and live in their traditional homes was achieved through discussions with nurses, other health care professionals and a volunteer group in Clarkson. Gaining access to potential participants, who no longer drive, through the volunteer group in Clarkson, required approval of their Board and that a member of the organization being present during the interviews to ensure the safety and security of the seniors involved. Finding seniors who no longer drive a car and have moved to a new home, proved to be relatively easy in the Clarkson-Port Credit setting. In this case the three participants live in a retirement residence in the area. In Vejlby-Risskov there were challenges to finding three seniors who fit the required characteristics as those undertaking the search could not find seniors who may have moved in part as a result of no longer being able to drive a car. In general, the three participants from Vejby-Risskov appear to have moved to be in closer proximity to needs, with less emphasis on connections potentially breaking down as a result of no longer being able to drive a car. One Mississauga participant (MCM2) no longer owns a car or drives a car in an everyday sense. Yet he still holds a valid driver's license and was considering renting a car when he visits the small northern Ontario town where he used to live. MCM2 was considered within group C as he does not use a car in an everyday sense and he moved from a previous home setting where he did use a car on a regular basis. One man was interviewed and disqualified from the list of Mississauga participants in this research. This man visits his wife everyday at a nursing home in Mississauga. He no longer drives and makes his way to the nursing home by getting rides from neighbours and people within his religious organization. His journeys home are usually arranged among several of his grown children, who take turns driving him home. As this man's home is located in the Town of Oakville, just west of the Oakville-Mississauga border, he was not included in the qualitative research. As one additional note on this man's daily trips to and from the nursing home, he does not use buses as it would involve two different municipal bus systems and he finds the connections between the two of them to be poor.

To ensure the privacy of those who participated in this research, actual names are not used. The general characteristics of those who participated and how they are referred to in this research is noted here.

Mississauga Participants

Car Drivers (Group A)

MAF1	age 73	female
MAF2	age 87	female
MAF3	age 81	female

Non-Drivers Living in Traditional Home (Group B)

MBM1	age 90	male
MBF2	age 81	female
MBF3	age 80+	female

Non-Drivers Living in Non-Traditional Home (Group C)

MCF1	age 89	female
MCM2	age 86	male
MCF3	age 84	female

Aarhus Participants

Car Drivers (Group A)

AAF1	age 65+	female
AAM2	age 65+	male
AAF3	age 79	female

Non-Drivers Living in Traditional Home (Group B)

ABF1	age 90	female
ABF2	age 65+	female
ABM3	age 65+	male

Non-Drivers Living in Non-Traditional Home (Group C)

ACM1	age 90	male
ACF2	age 88	female
ACF3	age 83	female

Among the Mississauga participants there is 7 females and 2 males. Among the Aarhus participants there is 6 females and 3 males. Overall this translates to 13 female and 5 male participants, across the two settings. At first glance there may appear to be a skewed gender ratio. It should be noted that at the time of the interviews the majority of the participants are widows or widowers. Herbel et al (May 2006) find that in the United States women represent 58 per cent of people age 65 and older and, that this percentage increases with increasing age. They note that women account for 55 per cent of people age 65 to 74 and 68 per cent of people age 85 and older. Based on Statistics Denmark on-line 2011 data, 53.9 per cent of the age 60 and older population is female. At age 80 and older, females represent 63.9 per cent of the population. Based on Statistics Canada on-line 2006 data, 56.5 per cent of the age 65 and older population is female. At age 85 and older, females represent 68.9 per cent of the population. Consequently, the male-female ratio is considered to be in line with the general demographics of both settings.

An interview guide was developed to ensure seniors fell into the assigned categories and to strive for common elements being probed in the interviews in Mississauga and Aarhus. Interviews in Mississauga were conducted by Christian Fisker. Interviews in Aarhus were conducted by Anne Møller Larsen, a Masters student at the Aarhus School of Architecture. A number of email conversations took place between the two assigned interviewers to ensure questioning and probings put forward would be similar. The interviews in Mississauga were digitally recorded and transcribed by a private transcription service. The interviews in Aarhus were conducted in Danish and digitally recorded. These recordings were then provided to Shelley Smith, Associate Professor, Department of Architecture, Design and Mediatechnology, who translated and transcribed the interviews in English. Shelley Smith, being a resident of Risskov also provided guidance on locations and terminology if these were unfamiliar to Christian Fisker. Once all interviews were transcribed into English a review was undertaken, examining themes presented within each case study setting, each participant type and across both settings. What follows is the themes that were presented through the qualitative research.

Qualitative Themes

What follows are the qualitative themes presented in the qualitative research. Each interview was typically about 1.5 hours long, resulting in about 27 hours of qualitative data. The initial review of the transcipts brought forward several overarching themes. Subsequent reviews brought forward further themes. From here a scoping down of narratives that demonstrate the themes in a concise manner were considered. Some of these narratives are included in what follows, as representative of the theme it is associated with. This is not to suggest that other narratives could not have been used as supplemental data in this section. While they may not be presented here, in a direct way, they have contributed to the themes presented. A complete set of the participant transcripts is included as Appendix B.

In an overall sense, the themes that are presented here describe how the mobility action chains of the participants change over time. This can be seen in their reflections on their current everyday connections and also their reflections on past connection configurations. In an everyday sense we see the malleability and plasticity of the participant's mobility action chains through the ways they configure and reconfigure their mobility action chains. Next, we turn more directly to car driving where we see this as a predominant form of mobility action chain configuration, when available. We explore the meaning of car driving and notions of freedom as expressed by the participants. Thereafter we consider the views of those who drive, asking them what their future without an ability to drive a car might look like. In different ways, participants drive less than they did in earlier parts of their life-course. Here we consider some of the

elements that contribute to this changing, including driver's license retesting, self-regulation, reduced confidence and driver's license revocation. Next we consider factors that may contribute to no longer driving, such as costs, health, car maintenance and pressure from others. We also consider abrupt decisions to stopping driving and former driver's reflections back on life as a car driver. Next is consideration of participant's various mobile with configurations, from regular, reoccurring ones through to occasional or special events. We can see mobile withs being formed with friends, family, volunteers and paid providers. We also consider more specifically mobile withs centred around car use, walking and taxis. We finish this theme considering some of the constraints, planning and coordination involved with mobile with configurations. This is followed by a discussion of various mobile other configurations, often seen among those with limited mobility or being predominantly immobile, where others are mobile, bringing needs towards some of the participants. We close this section looking at how some of these arrangements are temporary, elements of planning and coordination involved and the plasticity seen in these forms of mobility action chains. The next theme is home and how it is potentially reconfigured over time in order to stay connected to needs. For some, we see them move closer to resources and family. We also see the desire to remain in their neighbourhood in order to stay connected with resources they already use and also how in some cases, resources have left their neighbourhoods, introducing a need to reconfigure past established connections. Next, is technologies, where we consider some of the important technologies participants mentioned as contributing to their mobility action chain configurations. This includes cars, bundle buggies, buses, trains, walkers, an electric scooter, bicycles and telecommunications technologies. Lastly, is walking locally as a means of connecting with needs is considered.

Mobility Action Chains – Changing Over Time

Over time all of the participants have experienced changes to their mobility action chains. For some this appears when they still can drive a car, in the form of self-regulation that constrains when and how they use their cars. For some it is seen through a growing constellation of mobile with and mobile other arrangements that still have the car integral to these mobility action chains. For some, independent mobility, in the form of walking, takes on a heightened importance in terms of connecting with everyday needs. One Mississauga participant (MCF3) notes that one medical specialist she used to have when living in St. Catharines, and visited with her own car, has now moved to Toronto. The journey between her new home and the specialist's new office is 30 kilometres, with her grown children driving her to her appointments. Several Aarhus participants describe how their connections related to vacations has changed over time. Instead of driving, vacations are now by airplane or train (AAM2, ABM3). One Mississauga participant (MBM1) states that he no longer can ride in an airplane due to a medical condition and that he

does not take vacation trips anymore. Some participants describe connection configurations from when they had young children and they were in the paid workforce, as being very different from their connections today. As one Mississauga participant describes it:

> Everything changes with age. Children need you more when they are younger and they don't need you when they grow up. They really don't, they can live without you. (MAF2)

In a sense, many of both the Mississauga and Aarhus participants describe a physical lifeworld that is shrinking over time. One Mississauga participant states:

> My connections have shrunk from a large…I was never home. We [her and her now deceased husband] were either travelling for Kiwanis [service club] purposes, we would go to conventions. I have been all over the United States. (MAF2)

She states that many of her social events now take place within her apartment building, making for short mobility action chains. Another Mississauga participant (MBF3) describes how she used to drive into Toronto to see her son on a regular basis, when she still could drive. Another Mississauga participant, expressing her frustration in now being constantly tethered to an oxygen system notes:

> Well I can't do much of anything. I can't go to a mall, going out for a meal is very difficult, doing anything is difficult. I'm just not very mobile anymore. (MCF3)

Based on a recommendation from her doctor, she no longer takes trips in airplanes. An Aarhus participant describes how she participated in many events outside of her home, "But everything stopped when my husband got sick." (AAF1) Another Aarhus participant (AAF3) describes a physically shrinking vacation space. In the past she used to drive with a trailer across Europe. Now the 225 km drive to visit a cousin in southern Jutland feels long and tiresome, adding:

> Yes, it has changed over the years [driving patterns]. When was it now I last drove to southern Jutland? It was 2 years ago. I just don't feel like driving so far. Now, I don't use the car every day…(AAF3)

Another Aarhus participant (ACM1) describes how he and his wife went to Norway by car about 25 times over the years, with the last trip being about 5 years ago. No longer driving, he describes the strain of a long day if one takes a train or gets a ride with family:

> I have two grandchildren that live in Copenhagen. So I have contact to them. I also travel there. But I couldn't the last time. There's just been a christening I was supposed to go to – but I couldn't manage 12 hours in a day. I just can't. (ACM1)

As already noted, one Mississauga participant (MCF3), who resides in a retirement residence, is constantly tethered to oxygen which constrains her mobility. She used to make her own way to the dining room on the main floor of her building, for breakfast. Now she requires assistance with putting clothes on in the morning and breakfast is delivered to her apartment. One can see this as a mobile other arrangement inside a larger mobile other arrangement.

Mobility Action Chains – Drivers and the Change from Driving to No Longer Driving

Participants who still drive a car described some of the complex ways their car use is a part of their everyday lives. With some of the participants, their car driving can be seen as one portion of larger mobility action chain configurations. For example, one Mississauga participant describes driving somewhere in order to go for a walk (MAF1). In different ways, participants describe the serial nature of connections when they drive a car. One Mississauga participant describes how she first drives to the grocery store to do her food shopping and then carries on to the pharmacy (MAF2). An Aarhus participant drives her car to historical society meetings so she has flexibility afterwards to go shopping, visit a friend or go in to the city centre (AAF1).

Of the participants who drive, both in Mississauga and Aarhus, driving a car was a predominant element in the mobility action chains that connect them with needs. For one Mississauga participant, driving a car helped them overcome not being able to walk far and being in poor health (MAF3). For one Aarhus participant (AAF1), using a car is the preferred option, as opposed to walking, if it is winter and slippery outside.

The ability to drive a car has important meaning to both Mississauga and Aarhus participants who currently drive. For the Mississauga participants this takes on the form of an essential element to their everyday lives, recognizing that life would be difficult otherwise. Examples include that they do not think that one can live without a car in Canada (MAF1), or that they would feel 'lost' without their cars (MAF2, MAF3). Among the Aarhus participants who drive there is also a sense of the car being essential to everyday life, yet described in slightly more practical terms, such as describing their car as a 'practical object' (AAF1) and that a car is necessary. One Mississauga participant described loving her car and loving to drive, and:

> The feeling you get, get from A to B in good time and the feeling of the car, yeah. I enjoy that. (MAF1)

While some participants no longer have comfort driving on highways, two Mississauga participants (MAF2, MAF3) like highway driving, with one of the two stating that she does not like all of the stops along local roads. Several of the car drivers in Aarhus describe the heightened sense of security being in a car as opposed to riding public transit (AAF1, AAF3).

Freedom of Choice with a Car

Both drivers and non-drivers express, in different ways, the freedom that driving a car offers. As one Mississauga driver describes it:

> …I don't have a set day. I say today I am going to do this. Everything you can look forward to. (MAF2)

Another Mississauga participant (MAF1) describes the extra stops they can make along their journey and that they have the flexibility to visit different stores in order to get the best products. A former Aarhus driver states:

> …just having it parked out there [driveway] meant freedom. Freedom if I wanted to go into town, or just do some shopping. But that's the way it is now. I've had to accept that – there's nothing to do about it. (ABF2)

This sense of freedom can also be seen as a form of motility, where the car is available and the person who may want to become mobile holds a valid driver's license and holds the necessary driving skills. While not a common theme, this same Aarhus participant (ABF2) feels she still has freedom as she lives alone and can do exactly what she wants when she wants. A more common theme was the sense of being constrained when no longer being able to drive a car. When a former Aarhus driver was asked where he would go if he could drive, he answered:

> Oh, not far. Just around here where I live. They weren't long trips, but if it was raining and I had to do some shopping, it was nice to be able to drive instead of having a bike. Now I wait to do my shopping until the weather is good!! (ACM1)

In different ways the participants in Mississauga and Aarhus who drive describe that they drive less than they used to, now that they are out of the paid workforce, no longer looking after children and that there is now a smaller circle of friends as many have passed away.

Driver's License Retesting

Drivers and former drivers in both Mississauga and Aarhus describe their experiences facing driver's license retesting. In Mississauga, participants describe the retesting program controlled by the Ontario Ministry of Transportation. In general, the program requires seniors at age 80 and older to participate in a seminar and test every two years. About 12 to 15 seniors participate in these sessions at a time. Two Mississauga former driver participants (MCM2, MCF3) describe the seminar and test as 'not that hard' (MCF3) or not strict enough, with one participant noting:

> …it's not strict enough because I think that there is a lot of people driving out there that shouldn't be but I mean that is something that the government has a difficult time addressing. They are dealing with someone's independence and they have been driving all their life, I mean, how dare you? (MCM2)

In Aarhus, participants describe that at age 70 one takes a retest that is good for four years and thereafter one must take a retest every two years and at age 80 it must be renewed every year. This retesting program also involves a doctor's visit. For the most part, there appears to be acceptance of this program, with one participant noting:

> That's fine. It's also a good way to catch especially beginning dementia – that the doctor becomes aware of it. (AAF1)

Driver's License Revocation

In both Mississauga and Aarhus, there are examples of driver's licenses being revoked. One Aarhus participant's husband had his license revoked based on a dementia diagnosis (AAF1). One Mississauga participant received a diagnosis of tunnel vision, which resulted in the doctor informing the Ontario Ministry of Transportation (MAF2). Rather than accepting the revocation this participant went through a 6 month process of visiting a different specialist, receiving an opinion that she did not have tunnel vision, notifying the MTO and taking a re-test in order to get her driver's license back. In both cases, the revocation led to reconfigured mobility action chains for the persons having their driver's license revoked, and also their family and friends. For the Aarhus participant, it meant that she became an integral part of connecting her husband with needs from that point forward. For the Mississauga participant, there was a 6 month period where she relied on her children and a good friend, who acted as a chauffer, in order to make her everyday connections. While both settings have somewhat different operational scripts related to the timing and steps required for retesting, in both settings the revocation of a driver's license led to an abrupt change to the former everyday mobility action chains that utilize driving a car, leading to a greater dependence on others in order to remain connected with needs.

Driver Self-Regulation

Current and past drivers described a variety of self-regulated coping strategies that altered and reconfigured their car use mobility action chains, while keeping car driving in these chains. One Mississauga driver advises that she does not drive at night due to safety concerns (MAF2). Current and past drivers in Mississauga and Aarhus state that they avoid driving in busy areas or rush hour (MAF2, MBM1, AAF1). Other Mississauga and Aarhus current and past drivers describe how they do or did not like, and attempted to avoid, night driving (MAF3, MCF1, MCM2, ACF2).

Avoiding bad weather is a common form of self-regulation mentioned by current and former drivers in Mississauga and Aarhus (MAF3, MCF1, MCM2, AAF1, AAF3). One describes that grocery shopping can wait if the weather is bad (MAF3), while another participant (AAF1) describes how driving to Aalborg in the summer is alright, but taking a train is preferred in the winter. Again, we see mobility action chains being malleable and plastic. In these two examples, the first involves holding off the timing of the typical chain, whereas the second example provides an alternative chain that can allow a connection to proceed. A Mississauga participant describes how she does not make the 4 hour drive by highway in the winter, to visit her son (MAF3). Instead of attempting an alternative mobility action chain configuration, such as taking a bus, train or flying, she holds off until the next spring.

Reduced Confidence

Participants in both Mississauga and Aarhus describe situations that have reduced their confidence in driving and contributed to stopping driving (MBM1, MBF2, MBF3, MCF1, MCF3, ABF1, ABF2, ACF3). One former driver in Mississauga describes a scenario, from 2 years ago, where she thought someone could have been injured by her:

> …I crossed Truscott Drive with the car and then…turning left I went right ahead and up the curb and I didn't know how I got there and I sat there and said to myself, what the, I must have had a seizure you know. But the traffic on either side was very, very nice, nobody honked, nothing, they just let me get back and I got the car in the driveway, got in the garage, called my daughter and I said come and get the car, I'm not driving anymore because that could have been a person. (MBF3)

Another former driver in Mississauga describes that she is 'not as sharp as she used to be' and when she moved from Lindsay (small town northeast of Toronto) to a retirement residence in Mississauga, she did not want to drive in her new community:

Lindsay I knew like the back of my hand. Here [Mississauga] by the time you wait for half of these traffic lights to change you're not too sure what they want you to do. So I mean I thought no that's not for me. I better let go. (MCF1)

Now living in a retirement residence, many of her needs are addressed in the building. When she needs to travel somewhere she often calls on a relative who lives nearby and is accommodating. In this example an Aarhus former driver (ABF2) explains how vision challenges and discussions with doctors were mixed in with a reduced sense of confidence:

I drove all over the place – here and there – and to my siblings. It was so wonderful, but as the years went by I noticed that I started having a little difficulty seeing. I thought perhaps I should try to visit the eye doctor. But when I had to have my license renewed when I turned 70, my doctor said she didn't think I'd be able to. I was really disappointed and she said I should try to go to my eye doctor – which I did. He meant I could see just fine. So I went back to my own doctor, but she wasn't convinced. I said 'I have the forms to prove that my eyesight is good enough.' So she gave in, but a year and a half later I had to say stop on my own. I was so upset. It was such a disappointment. The thought that I no longer would have a car was so tiresome. But I was out one day driving, and there was quite a bit of traffic. I had a hard time placing myself in the traffic. I made the decision then and there that it was time to sell the car before anything happened. So I sold the car. I lost quite a bit of money on it – but there was nothing to do about it. I had so enjoyed having a car. But I've gotten over it to the extent – well it doesn't do any good to cry over spilt milk, as they say, because it won't get any better. Therefore I've turned it around to a positive thing and thought, of course you can walk. That's a good thing for me. And now I don't think about that anymore. (ABF2)

Another Aarhus former driver (ACF3) states that if you are driving foolishly, you are likely the last one to notice and she did not want to end up in a situation where someone else would decide that she could no longer have grandchildren in her car.

Past Car Accidents and Near Misses

Several participants in Mississauga and Aarhus raised traffic accidents, or near misses (MAF2, MCF1, ACM1). One Mississauga driver describes two accidents she has been involved in and how she broke her neck in one of them (MAF2). A former Mississauga driver, reminiscing of several near misses notes:

Oh many a time I've driven and I've said to myself, "Thank you Lord for getting me through that one." (MCF1)

A former driver in Mississauga (MBF2) states that when she was 47, her 17 year old son was in a car accident and that it upset her so much that she stopped driving and relied on her husband to

drive her places. A former driver in Aarhus describes an accident where he ended up in a ditch and the driver of the other vehicle died (ACM1).

Looking to a Future Not Driving

Participants who currently drive were asked to consider a time in the future where they were no longer able to drive. Among the Mississauga participants the response tends to be that they would rely on family, friends, taxis and buses, without getting into describing specific configurations of these alternatives, or contemplating moving from where they live as a means of reconfiguring how one connects with needs. With the Aarhus participants there is more contemplation of specific scenarios that would enable them to remain connected to needs in some reconfigured way. One example is:

> I don't think not driving would mean moving for me. That would be irritating. I could still walk around here without the car. I could do that. I'd have to make some changes but…some grocers send goods and Salling [department store] sends goods out. You can supplement the things that you can carry yourself. I would have to change my ways, of course, because my life is so based on the car as it is. So there are things I would have to change – I'm sure it would irritate me that I had to make changes, but it wouldn't be impossible. (AAF1)

Here we see a participant beginning to map out specific alternative mobility action chain configurations, if driving a car was no longer possible.

Factors Contributing to Decision to Stop Driving

Participants raise a number of factors that contributed to their decision to stop driving. These included, costs, maintenance, health and pressure from others. The decision to stop driving a car due in part to the costs of keeping and maintaining a car is raised by some of the Aarhus participants (ABF2, ABM3, ACM1, ACF2) and one Mississauga participant (MBM1). One Aarhus participant finds that there was considerable maintenance hassles, when compared to the amount of time and travel she actually used her car for:

> And to have a car and just drive to Veri Center [shopping centre] and home again. Then every once in a while you need to take a good long drive on the highway in order to get the motor really warmed up. And then it has to be treated underneath, and then you have to stand and dip this long stick in the oil to check it, and is there enough water…Oh no. I had no desire to do that stuff. After 3 years I just didn't want to do that anymore and I asked if they [daughter and her family] wanted the car. (ACF3)

Health was raised as a factor towards deciding to stop driving among a few participants in Mississauga and Aarhus. For one Mississauga participant, needing to be connected to an oxygen system all of the time contributed to her stopping driving (MCF3). One Aarhus participant (ACM1) knew he was having challenges with his vision yet it was when he got ill and had to go to the hospital that he decided to stop driving. Among the Mississauga and Aarhus participants there are a few examples of family pressure being brought forward to convince an older person to stop driving. One Aarhus participant (AAM2) recalls borrowing his father's car as a way of keeping the car away from him. One Mississauga participant describes a scenario that had herself and her grown daughters putting pressure on her husband to stop driving:

> Well one time I felt so bad my daughter said "Dad you shouldn't be driving." He said "I drive until I can't drive and that's it." So then this happened this meeting where we almost got into an accident and I refused to go visit my kids and he took his car and I took my car. And then my daughter said "Holy smoke, you have a bunch of kids, can't you get together?" And I said "No I won't go there because no I can see that Dad shouldn't be driving. So OK. Then Dad went in the hospital…and then we took the license away. And he didn't drive anymore. (MAF3)

One Mississauga driver describes how her husband had decided to stop driving very suddenly, while he was driving on a highway:

> [husband's name] one day stopped the car on the 27 highway and I thought what is he doing…I thought something was wrong and he said "You better drive."   So I watched it, turned around and slid in and he said from now on, you are my chauffer, I am not driving anymore. He never gave up his license but he never drove again. (MAF2)

In this brief moment in time we see how the decision to no longer drive a car alters everyday mobility action chains, and in this case, requires dependence on a spouse.

Transition to Non-Driver and Reflections

Participants provided details on the ways they configure their connections to needs and how this has changed over time through the transition from a driver to a non-driver. For some the period of change was hard:

> It was hard [adjusting to not driving a car anymore]. It used to be I just got in the car and took off to here or there. (ABF1)

For some the period of change went somewhat more smoothly due in part to walking proximity to buses (ABM3) and resources such as a grocery store and pharmacy (ACM1). There was a

sense of missing a past way of doing things among some of the former drivers. Some describe the sense of dependence on daughters (MBM1), buses, trains and others (ACF2) in order to make their way now. As one Aarhus participant describes it:

> It's something everyone misses not having a car and being able to get around on your own. Not being able to drive means that you are dependent on buses, trains and other people. (ACF2)

One former car driver in Mississauga describes a car as a measurable part of one's body and life (MCM2). One former car driver in Aarhus reflected back on its importance when their children were young, but now he and his spouse no longer need a car (ABM3).

Mobility Action Chains – Everyday Malleability and Plasticity

In describing their everyday connections, participants in Mississauga and Aarhus describe a wealth of malleability and plasticity in how they configure and reconfigure their mobility action chains in order to adapt to changing circumstances. One Mississauga former driver participant (MBF3) describes how she needed to pick up a renewed prescription. First she called the pharmacy to check and was informed that the doctor had not yet called in with consent. Next, she visited the pharmacy and the prescription was not ready as the doctor had still not called in consent. At the time of the interview she was planning her next visit in order to obtain the prescription. Each of these visits requires organizing a mobile with. Another Mississauga participant (MCF1) walks to a nearby church. If she wants to go to several other churches a little further away, she attempts to find a ride with someone. Several Aarhus participants describe not walking when it is slippery outside or very windy and rainy. The reconfigured mobility action chain for one participant (AAF1), when it is slippery to walk is either taking a car or a bus, if she does not have to carry heavy things. The reconfigured mobility action chain to avoid rainy and windy weather can also involve holding off on doing outdoor things and do things indoors in the meantime.

Mobile With

Among the Mississauga and Aarhus participants, mobile with arrangements can be seen in a full spectrum of mobility action chain configurations, from regularly scheduled events, through to special or rare occasions and involving friends, family, volunteers and paid assistance. One Mississauga participant (MBF2) describes how her son now does most of the required driving for her. Her son lives about a 20 minute drive away and the two of them have a pre-arranged schedule that Mondays are grocery shopping, pet store and bank day. This configuration creates

a serial form of a mobility action chain, with multiple stops along the way to address a variety of needs. She describes that she has to plan her grocery list carefully now that these trips take place once a week. There used to be a grocery store within walking distance of her home, which previously provided her with more flexibility. Related to family occasions, one Mississauga participant notes:

> They phone me to say, so and so's birthday is coming up, we'll pick you up on Sunday or Friday or whatever. And they do and they're good. (MCF1)

One Aarhus participant (ACM1) notes that his family usually picks him up by car for family special occasions in Torsager, near Viborg. Usually his son will pick him up for visits with the grandchildren. Noting some plasticity in the form of connection, he states that it is possible to get there by bus, but 'it's a bit of a pain.'

Many of the Mississauga participants (MAF2, MAF3, MBM1, MBF2, MBF3, MCF1) and some of the Aarhus participants (AAF1, ACF2) describe travelling together with friends in cars as a way of making their connections. Some of the Mississauga participants describe catching a ride from friends in order to get to places such as church and going to play cards (MBM1, MBM2, MBF3). One Aarhus participant describes how she sometimes travels along in the car of a friend and they will share the fuel cost (ACF2). For some of the configurations, the participants are the car driver. One Mississauga participant describes how she picks up others to go play cards:

> I pick my partner up and sometimes the other partner that needs a ride because she doesn't drive anymore. So I will pick her up. Nobody picks me up as I am the furthest, you see. (MAF2)

Another Mississauga participant describes how she was a volunteer driver in her former small town community:

> I was the taxi service for my little group. I mean some of them couldn't even get their boots done, you know. Go in put their boots on. Bring them out over the icy sidewalk. Put them in the car. Couldn't lift their feet in, you'd put their feet in. (MCF1)

An Aarhus driver also describes being a volunteer driver, yet with this scenario, those seeking a ride walk from their homes to a main road for pick up:

> Yeah, we can pick them up along Nordre Strandvej. They can go there on their own. We don't need to pick them up at their door – they're not sick. We just pick them up. (AAF1)

Family members involved in mobile with arrangements with the participants consisted of a niece's son (MCF1), a sister-in-law (MBF2), a son-in-law (MCM2), sons (MBF2, ACM1) and the most prevalent being daughters (MAF2, MBM1, MBF3, ACF3). While these arrangements exist among both the Mississauga and Aarhus participants, they were mentioned more often among the Mississauga participants. One Mississauga participant, recognizing the ease of connections through mobile withs, with her daughter notes:

> …but I'm fortunate…I have two wonderful daughters that live in Oakville [about 12 km to the west] that will come and get me and do come and get me and bring me anywhere I want and even when, they help me get groceries, and pushed the cart, put's it through the express, brings it to the car, comes in the driveway, puts it in the fridge, can you ask for anything better than that? (MBF3)

One Aarhus participant describes that her daughter who lives in Risskov will come pick her up by car and then they go to the daughter's house for a visit. Two of the Aarhus participants raised their uneasiness, or guilt, in asking and accepting rides from family. When one participant was asked if she needs to be picked up or brought somewhere, what does she do, with the reply being that it is 'terribly hard' to ask children for assistance:

> Either I stay home or if I…I sometimes ask my daughter in Mols. But if it's not anything that interests her, I won't ask. I was at a course during the summer and I asked her to drive me. I could've taken the bus, but then you have suitcases and all of that. And maybe a bus change. So I paid her to drive me – I paid for gasoline. That's only fair. (ACF2)

The other Aarhus participant describes a situation where he felt bad about calling his son-in-law and how he waited until the last moment. Not surprisingly, considering that some of the non-driving Mississauga participants were connected to this research project through a volunteer driver organization, some participants mentioned volunteer drivers. One participant (MBM1) used to be a volunteer driver, taking a lady for blood tests once a month. Another participant (MBF2) gets a volunteer ride to her doctor's appointments. Participants describe the many complex ways that they enter into mobile with car arrangements with others in order to connect with needs, with these arrangements appearing more prevalent among the Mississauga participants. Expressing the plasticity of her car focused mobility action chain configurations, including mobile with arrangements with a family member, a Mississauga participant notes:

> Well there has been times where he's [niece's son] taken me once a week depending on where I have to go. I hope he's off the hook for a while because I'm finished with the ophthalmologist and I have to go and have my teeth professionally cleaned every three months. So this should be coming up shortly. (MCF1)

Here an Aarhus participant expresses the plasticity of mobility action chains, where one configuration is a car centred mobile with and the other possible configuration is independent mobility on a bicycle, for shorter journeys:

> I always have some friend I can come along with [riding in their cars to go to choir]. I drive with them. If it's not too far, I can bicycle. But otherwise I get a ride. (ABM3)

A number of participants describe past and present mobile with car arrangements where they, plus their spouse, team up to accomplish connections. A few Mississauga female participants describe how they drove and their husbands were the passengers (MAF1, MAF2, MCF1). One participant (MAF2) describes how they would do grocery shopping together on these trips. Another participant describes how she would drive as her husband had had a stroke and had lost most of his eyesight. One Mississauga participant finds that she had a more established pattern of connections when her husband was still alive (MAF1). For one Aarhus male participant, he tends to drive the longer car trips and his wife drives the shorter trips. An Aarhus female participant obtained her driver's license later in life as her husband was ill and needed dialysis three times a week, noting:

> He became less sure behind the wheel so I got my license so [I] could share in the driving. (ACF2)

An example of a rare walking mobile with that presented itself, is an Aarhus participant who with her neighbour, also a widow, walk to the grocery store together (ABF1). These trips tend not to be planned in advance and form out of by-chance meetings and discussions over their common hedge. Here an Aarhus walking mobile with transitioned into a car based mobile with, with no advance planning:

> This morning when I was walking around I met her [neighbour] and she asked where I was going. She said she was on her way to Veri Center and I was headed to Vejlby so she offered me a lift. That was very nice of her. (ACF3)

Mobile With – Taxis

In both Mississauga and Aarhus, some participants use taxis from time to time in order to make their connections. One Mississauga participant (MBF2) does not like asking family for rides on Sundays and will take a taxi to and from Sheridan Mall. It takes about 5 minutes between when she calls in the taxi request and when the taxi arrives. An Aarhus participant (ABF2) takes a taxi instead of a 15 minute walk, to her hairdresser, if it is raining. In all she says she takes a taxi 3 or 4 times per month, with some trips being about 100 km, to Holsterbro, near the west coast, to

connect with family. In both settings, participants who use taxis describe the planning and coordination that can be involved. A Mississauga participant describes it this way:

> …and then I have an arrangement. I have to go to physiotherapy at least twice a month and all my medical appointments and everything else. I have an arrangement with an individual that owns his own taxi company and I've got his cell phone number so whenever I need him. I have a perfect arrangement, he picks me up and drops me off and the I phone him when I am ready to come back. (MCM2)

An Aarhus participant (ABF1) describes her coordination of connections and taxi use this way:

> People drive me home. No I don't miss anything and I can take a taxi when it suits me. When I need to shop if I'm not moving around so good I can just take a taxi up there and when I'm done I get a woman behind the counter in the grocery store to call a taxi for me to take me home. It works just fine. I could take a bus. I could walk up there – it would take some time – but I could walk. (ABF1)

Empirically taxi fees in Denmark are more expensive than in Canada. This alternative may require additional financial resources, when compared to the Canadian setting, limiting its motility within mobility action chains of Danish seniors.

Mobile With – Constraints

In a number of different ways Mississauga participants note the constraints on possible activities, and associated mobility action chain configurations, that mobile with arrangements involve. One participant (MBF2) notes that one needs to arrange a trip with a volunteer a week in advance of when one is seeking a ride. This is in stark contrast to participants who drive, describing the freedom to come and go on a whim. The same participant (MBF2) notes how she coordinates a possible ride to bingo:

> I'm supposed to call [bingo friends] between 3.30 and 4.00 [immediately after the interview] and see if they're going and if they're going to take me. (MBF2)

Several participants raised concerns about the driving abilities of others they form mobile withs with. One participant who drives says she feels safest when she is the driver (MAF3). Another (MBF2), notes:

> I don't go into anybody's car unless I know how they drive. After two bad accidents, I am very careful. (MBF2)

Mobile Other

Participants in both Mississauga and Aarhus describe a variety of mobile other arrangements, both where they are the mobile other and where they receive needs from a mobile other. One Aarhus participant (ABF2) describes how she used to be a 'visiting friend', visiting housebound seniors. One Mississauga participant (MAF1) describes how she visits friends about 15 km away every three weeks or so, where she brings dinner along. More common is that participants are the receiver of needs through a mobile other arrangement, through family, public and private services. In terms of family providing mobile other arrangements, daughters and sons are the most prevalent among the participants. One Mississauga participant (MAF3) has a daughter visit her once a week. Another Mississauga participant (MBM1) has three daughters, one living more than 100 km away, each of whom visit him once a week. He fully recognizes the frailty of this arrangement and that he could not continue to live in his house were it not for the assistance of his three daughters. While at his house they do his laundry, clean, and at times undertake mobile with arrangements where a daughter and their father travel together to do grocery shopping or, to take him to a barber for a hair cut. Sometimes one of the daughters will arrive with a take-out meal.

Several of the Mississauga participants (MCF1, MCM2, MCF3) live in a retirement residence where staff provide housekeeping services, social programming and prepare and serve meals. In this sense, the staff of the residence are mobile others that come together to address the needs of those who are relatively immobile. Yet here too, one can see arrangements with family as a daughter visiting from time to time, a son picking up his mother for weekend dinners at his house and a family organizing a dinner at the retirement residence where 13 adults and 6 children attend (MCF3). One Aarhus participant (ACF2) describes that her daughter visits her once a week while at the same time she recognizes the competing interests and needs that put limits on how often children and grandchildren visit:

> Probably the biggest dream one has, has to do with family. When you're children have had children you're also a part of all of that and can't help but think how the one and the other are – how they're doing. This is something you learn when you get older – family comes when they have the time for it – friends, children, sport – all those things come first. They have their own lives. (ACF2)

Another Aarhus participant (ACF3) lives close enough to relatives that her grandchildren often ride their bicycles over to her place for a visit.

Mobile other arrangements can be seen related to particular services such as pharmacies, banks, mail, care and home help. One Mississauga and one Aarhus participant (MBM1, AAF1) describe how their pharmacies deliver to their homes. In terms of banking, one Mississauga participant (MBM1) describes that one of his daughters arranges his banking by telephone. Another Mississauga participant (MCF3) does her banking when bank staff visit the retirement residence she lives in, every other week. Related to mail, one Mississauga participant (MBM1) has his daughters coordinate sending out his mail. For another participant (MCF1), instead of walking to the nearest mailbox, occasionally she asks a 96 year old man, who still drives, to drop off her mail on one of his drives. Both Mississauga and Aarhus participants describe care being delivered in their homes (MBF2, MBF3, ABF1, ACM1). Both Mississauga and Aarhus participants describe formal gardeners or family or neighbours, helping them look after their gardens and snow removal (MAF3, MBM1, MBM2, AAF1, ABF1, ACM1). Participants in Mississauga and Aarhus describe a complex network of regular visits to their homes by home helpers and home cleaners. The frequency of these visits ranges from several times a week (MAF2), to once a week (ACF2, ACF3) to every few weeks (MBM1, MBF2, ABF1, ACM1). One Aarhus participant (ABF1) describes that in addition to these regular visits, she also has a daily visitor who comes both mornings and evenings to assist with putting clothes on and taking them off, noting that it all began as a result of a fall:

> It is something the municipality has taken care of. It probably started when I fell a couple of years ago. I fell in the foyer and my hip was dislocated. I have a new hip but it has actually been dislocated three times. Once I fell in the garden and lay out there for three hours until my neighbour came by – that was August. I lay there for three hours. I couldn't get up. Then my neighbour came by. It was lucky with the time of year. (ABF1)

Here we see an example of the body breaking down, the body being a central part of what enables or disables mobility action chains. Without an ability to 'extend' oneself, one relies on mobile other arrangements in order to connect with needs.

A number of temporary mobile other arrangements can also be seen among the participants. One Mississauga participant (MAF2) describes how in her former home there was a period where she had a nurse visit her everyday while she was convalescing. During this same period she had a cleaning lady and friends who would take care of groceries for her. Another Mississauga participant (MBF2) describes being housebound after knee surgery, where a sister-in-law stayed with her for 3 nights and a son stayed for 4 nights. In preparation for knee surgery, the health care team wanted to hear what assistance was going to be available at home after surgery. An Aarhus participant (ACM1) describes a period where he had three nurses visit him everyday:

> I had someone [home help] when I was sick. I couldn't do anything. I couldn't
> even get out of bed – I had some supports attached. I couldn't put on my socks,
> I couldn't button my shirt – I was that poorly! (ACM1)

As already noted, some of the Mississauga participants reside in a retirement residence, where those who are relatively immobile can have their needs addressed by staff of the building, forming a mobile other arrangement. One participant living in a retirement residence (MCF1) describes a short period where she and several other residents were confined to their apartments due to a stomach flu outbreak in the building. Rather than the usual chats in the dining room and community rooms, this resident, and others who were quarantined, would call each other to see how they were doing. Instead of eating in the dining room, staff delivered meals to resident's apartments.

Several participants in Mississauga and Aarhus describe how having a relatively immobile, housebound, spouse, impacts their possible activities. For one Mississauga participant (MAF3) her husband was housebound for the last year of his life. One Aarhus participant notes the isolation that comes about from caring for a housebound spouse:

> It's not so hard when you're in it, but it can be difficult because you become so
> isolated as a result of it. That was what bothered me the most. (AAF1)

Similar to the mobile with arrangements, with mobile other arrangements, there are planning and coordination efforts to ensure their success. For one Mississauga participant (MBM1), his three daughters have a marked up calendar on his refrigerator, that helps ensure all visiting know who has visited when, who will be visiting when and for what purposes. An Aarhus resident here notes a combination of virtual and physical mobile other arrangements involved in her grocery shopping:

> When the stores open on Sundays my daughter goes shopping and she'll write
> an SMS [text message] to me Saturday evening and ask what I need. Then
> she'll pick it up on her way over here on Sunday. (ACF3)

A range of mobile other malleability and plasticity can be seen in different arrangements, producing different mobility action chain configurations. For those who can still drive, sometimes they will drive to a friend's home, while other times the friend will come to them (MAF1). In some of the grandparent-grandchild relationships, sometimes the participants visit their grandchildren's home, through independent mobility or through mobile with arrangements, while other times the grandchildren come to them, either on their own, such as riding a bicycle, or brought by parents in a car.

Home

Participants in both Mississauga and Aarhus provided details regarding how suitable their current home, and its location, may be in the future and if they have moved from their traditional home, how that decision was reached. In different ways most participants express contentment with their current home location and hope that it will be suitable for their needs in the future. Two Mississauga participants (MAF1, MAF2) had moved from their traditional townhomes into nearby condominium apartments in order to address their husbands' reduced mobility, while still being connected to the same resources in their neighbourhood. An Aarhus participant (ACF2), who also moved from her traditional home, chose an apartment based on its proximity to shopping and meals as she says she can't expect her children to help with these things, noting:

> You just have to adjust to that. (ACF2)

For several Mississauga and Aarhus participants, the size and upkeep of a home and garden are contributing factors to moving (MAF3, ABM3), while looking to stay in the same neighbourhood. One Mississauga participant (MBF3) describes a temporary reconfiguration of home while she was convalescing. For several months she lived in a retirement residence and then she stayed at her daughter's house, before returning to her traditional home. This resulted in several substantial reconfigurations of mobility action chains connecting her with needs. For three of the Mississauga participants, they had moved to their current home locations in order to be closer to family (MCF1, MCM2, MCF3). One participant (MCM2) describes that when his wife passed away ten years ago he was living in Kirkland Lake (about 600 km north of Mississauga). He continued to live there on his own for two years and then moved in with a daughter in Toronto. At this location he had his own space but the family travelled a lot and he was not comfortable being on his own in case issues came up. From here he moved to a retirement residence about a 15 minute drive away from another daughter, where he now goes for dinner every Sunday. Another participant (MCF3) was living in St. Catharines (about 90 km from Mississauga). When her husband passed away she moved into her current location in part to be closer to her son. The other participant (MCF1) was living in Lindsay (about 160 km from Mississauga) and moved to Mississauga in part to be closer to a niece's son who is helpful to her:

That's why I'm here. My step children, one's in Ottawa, one's in the Beaches [a Toronto neighbourhood]…I never saw them. I have a niece who has four kids…live in Mississauga. The girl lives in Bloor West Village [a Toronto neighbourhood]. The boy in Mississauga, one of them works out of his house. He's in computers and does wonderful things. He's so obliging. I mean I would say [name] I have a dentist appointment, do you think you could? Well what time is it auntie [name]? You know. Although I try to arrange things around his time because you know he does have a busy life. He is such a good boy. I'm fortunate. (MCF1)

While recognizing that there may ultimately be a need to change homes at some point, one Aarhus participant notes here intentions to stay connected to her current doctor and dentist:

I don't really like changing doctors and dentists and that sort of thing. I think it's practical that they know you. I don't have to start from the beginning telling them that I have this and that wrong. (AAF1)

Several participants (MBF2, AAF1) describe resources that used to be a short walk away from their homes which have since moved away. Here is one Aarhus participant's example:

Among other things, there used to be a bank and a post office in the building you can see over there. They moved the post office and I complained about it to the people in Copenhagen. 'Oh', they said 'it's only a kilometre and a half away.' When they were looking at their map, they couldn't see that kilometre and a half was uphill and there was no bus. (AAF1)

Technologies

The Mississauga and Aarhus participants describe a full range of technologies that contribute to their ability to make connections with needs. Many of those who still drive take considerable pride in their cars, offering to show them to the interviewers. One Mississauga participant (MAF1) describes how she and her husband each had a car and she traded them in for one new car when her husband passed away. Several of the Mississauga participants describe what happened to their cars when they were unable to drive. During the 6 months one participant (MAF2) was unable to drive, her car was used by two grandchildren. Another participant (MBF2) describes how when she and her husband could no longer drive, they sold their car at a local car dealership. Yet another participant (MCF3) describes how she gave the car to her son.

Both Mississauga and Aarhus participants describe using bundle buggies. For the Mississauga participants (MAF1, MAF2) the buggy is a tool within a larger mobility action chain using a car. Both keep their buggies in their cars, drive to where they will do their shopping and then take the buggy into the store. One of these two Mississauga participants (MAF2) describes an elaborate mobility action chain on the journey home from shopping, as she parks her car in an underground

garage that does not have access to the building elevators. First she parks her car next to the bicycle room, then gets a wagon out of this area and loads it with her groceries. The wagon is then pulled back into the bicycle room and she parks her car in the garage. Next, she returns to the bicycle room by foot, to take the full wagon up the elevator to her apartment. Then she returns the empty wagon to the bicycle room. For the Aarhus participants (AAF3, ABF1, ABF2), the bundle buggy is part of a walking based mobility action chain between home and shopping. Here one participant describes some of the possible mobility action chain configurations, with the use of a bundle buggy:

> Yes, a kind of trolley. I am so happy to have that. I can just drag it along. I only have 5 minutes [walking] to Aldi [grocery store]. I just pull stuff off the shelves – I can have so much in the trolley. So I manage just fine. And Super Best [grocery store] is just 10 minutes from here [walking] – I have a back way I can walk. And then there's Veri Center [shopping centre] which is half an hour away [walking]. I go there sometimes because my bank is there. And then there is Føtex [grocery store] over here. It only takes 15 minutes to go up there. My hairdresser is around there. (ABF2)

One constraint of the bundle buggy this participant mentioned is that she cannot buy a big case of beer, but she can buy 6 beers at a time at Aldi.

Taking a bus among the Mississauga participants is either non-existent or extremely rare, and they have little or no familiarity with bus routes, other than seeing buses on the road from time to time. Many of the Aarhus participants utilize the bus system. One Aarhus participant (AAF1) states that there is one bus running near her home, every half hour during the day and every hour on evenings and holidays, "So you're not completely cut off." Several participants find the bus routes geared around those looking to make their way to the city centre versus making their way from one part of north Aarhus to another part of north Aarhus. The participant already noted above (AAF1) also notes that it is difficult to arrange multiple stops on a journey using the bus system, due to the scheduling of different routes not creating seamless connections. A number of Aarhus participants (ABM3, ACM1, ACF3) describe how the bus routes will be changing and there is no clear picture, at the moment, as to what the bus routes and their frequencies, will look like after the changes.

Taking a train among the Mississauga participants is non-existent or extremely rare. Several Aarhus participants describe taking the train to Copenhagen once or several times a year (AAM2, ACF2). One participant takes the train into Aarhus city centre with his wife sometimes. Another participant (ABF3) sometimes takes a train to communities like Tarm or Varde and is then picked up by family. One Aarhus participant (ACF3) describes a constraining nature of the train, when referring to how she used to take the train to Vejle for Sjorgren Association meetings, as the

meetings were held in the city centre. Now that the meetings are held further away from the city centre, she arranges a taxi ride through the Falk service.

A number of participants (MCF1, MBM1, ACF2) in Mississauga and Aarhus describe using a walker to assist them with mobility outdoors as well as in their homes. One Mississauga participant (MBM1) has three walkers positioned in his home in such a way that they assist him on different levels of his house and transitioning outside. One Mississauga participant (MCF3) has an electric scooter, which she uses to move around inside her retirement residence building and also in the local neighbourhood. With the use of a portable oxygen system, this gives her more flexibility than the more fixed oxygen system in her apartment. One downside of using this electric scooter outside, on sidewalks, is the bumpiness of the ride which translates into considerable pain in her body.

Bicycles are described as a mobility option among some of the Aarhus participants and none of the Mississauga participants. Several Aarhus participants describe the plasticity of using a bicycle or alternative means of making a connection. For one, (AAF3) the choice is between a bicycle and a car, with a car winning out if it is raining. Another person (ACM1) would like to ride his bicycle more often but he will not use it if it is windy and raining. Thinking about what he would do if he could not ride his bicycle anymore and replying that he would take a bus, one participant (ABM3) notes:

> We're getting older. I can feel it. We just have to help each other more. That's why we're here – to help each other when we get old. (ABM3)

One participant (ACF3) describes that riding a bicycle is now difficult due to balance issues. Another participant (AAF3) raises the issue of the steep hill on the bicycle paths coming north out of the city centre on rides home. She tries to use a path that is not as steep. Regardless, she likes to use her bicycle to go to the city centre due to there being limited car parking and she considers the bicycle paths good connections.

In both communities there is a mix of participants who use telecommunications technologies, including the internet. A few in both communities use internet banking (MAF1, AAM2, ACF3). In both communities some use email to communicate with children and grandchildren (MAF3, ACF3). Telephones are used by the participants as a social tool, in terms of chats with friends and families and also to arrange mobility connections. One Aarhus participant (AAF1) describes having a cellular phone that she keeps turned off most of the time as she treats it as a tool for emergencies as opposed to general discussions. Several participants in Mississauga (MBM1, MBF3) and Aarhus (ABF1, ACF2) utilize an emergency response system which enables them to

connect quickly with someone should there be a need to. One Mississauga participant (MBM1) describes pressing the button while in his home. The service was then able to speak with him hands free and determine that an ambulance should be called. Fifteen minutes later an ambulance was there picking him up to take him to a hospital. The service also contacted family members who then came to the hospital. In both settings, those who use the system feel a sense of security or comfort in knowing they could quickly ask for help while they are physically alone.

Walking Locally

Walking locally in order to connect with needs is more prevalent among Aarhus participants (AAF3, ABM3, ACM1, ACF2, ACF3), than among Mississauga participants. As noted ealier in the empirical discussion of Mississauga, the city acknowledges that the 'curvy' and cul-de-sac road design discourages walkability. Aarhus participants mention walking to local places like their bank, church and community centres. One participant walks to the community centre every second week to meet with a nurse. This same participant (ACM1) walks about 300 metres, on a regular basis, to visit his wife's grave. Another participant (ACF2) walks about 3 minutes to get to the community centre where she can have a meal, noting:

> There's a large table of us that eat there every day and we look out for each
> other – take care of each other. (ACF2).

Mississauga participants who walk mention going to a post office (MAF1, MBF3), church (MAF1, MCF1), library (MAF2, MCM2) and a coffee shop (MBF2). Journeys that involve bags related to grocery shopping was not prevalent. Several participants in Mississauga and Aarhus describe that they can no longer walk well and that a car provides a form of coping strategy and compensation (MAF2, AAF1). Here for example:

> What has changed the most is I don't walk as much. I can't really go on long
> walks or for walks in the woods because I have a bad leg. That means I drive
> instead and many times we agree that I'll go along for part of the tour and then sit
> in the car or something like that. I'm not as mobile as I was 5 years ago due to
> arthritis in my ankle. So I can't walk so much. That's also why I use the car
> more and more. (AAF1)

With a reduced ability to walk, and growing emphasis on driving a car, there may be considerable constraints on possible mobility action chains in the future, should the ability to drive a car disappear. Some participants describe self-regulation in their walking to avoid isolated areas (ACF3) and not walking in bad weather (MAF3, AAF1).

Qualitative Research – Findings

We can see both similarities and differences among the participants in Mississauga and Aarhus. In both settings we see the mobility action chains of the participants changing over time. Car driving is a predominant element in the mobility action chains of those who can drive. Participants in both settings describe similar ways of self-regulating their driving and driving less than in the past. Factors contributing to no longer driving were similar in the two communities, with the exception of costs and maintenance, which were mentioned more often by Aarhus participants. Mobile with arrangements are present in both settings and somewhat more prevalent among the Mississauga participants. Mobile other arrangements are common among both Mississauga and Aarhus participants. One striking difference regarding home is that three of the Mississauga participants moved to where they are now in part to be closer to family. We see these individuals entering into mobile with and mobile other arrangements with their nearby family members. This characteristic is not present among the Aarhus participants.

Both Mississauga and Aarhus participants use a range of technologies in their mobility action chains, including cars, for independent mobility and mobile with and mobile other arrangements. Bundle buggies are used in different ways among the Mississauga and Aarhus participants. For the Mississauga participants who use a bundle buggy, it is used within a larger car based mobility action chain. For the Aarhus participants, a bundle buggy is used as part of a walking based mobility action chain.

A striking difference between the Mississauga and Aarhus participants is bus use. For the Mississauga participants, this is not an actively used form of mobility and there is little or no desire to use it, even though they mention seeing buses move through the community. For some of the Aarhus participants, the bus system is an active option while at the same time acknowledging some of the constraints and challenges to using the system. Train use is another area of difference, with some of the Aarhus participants using trains for trips from time to time, while it is not used by Mississauga participants. Bicycles are another area of difference between the Mississauga and Aarhus participants, with it being actively used by some of the Aarhus participants and none of the Mississauga participants. Both Mississauga and Aarhus participants use telecommunications technologies to varying degrees, with some in both communities using emergency response systems. Walking, as a means of connecting with needs, presented a difference between the Mississauga and Aarhus participants, with it being more prevalent among the Aarhus participants.

When seen as a whole, the Aarhus participants see, consider and use a wider spectrum of mobility action chain configurations, beyond chains that are car focused. For the Mississauga participants, alternatives to not driving a car tend to involve mobility action chains that still have a car as its central focus, through mobile with and mobile other configurations. Whether non-car focused mobility action chains are possible in the Mississauga setting raises interesting questions. Is there a bus network in the Clarkson-Port Credit setting? Most certainly. Did the Mississauga participants have past experiences using buses? Little or none. This is an area that would be worthy of additional research. In terms of walking, the walking distance to resources, such as grocery stores and pharmacies, appear somewhat similar, yet Aarhus participants describe walking to a greater degree. Why? From the empirical research it was found that shops in Clarkson-Port Credit have larger parking lots that a pedestrian needs to cross as part of a walking based mobility action chain, compared to Vejlby-Risskov. Perhaps this is a contributing factor, but more research is required in order to investigate this fully. Bicycle use was another area of distinct difference, with some Aarhus participants using them as part of possible mobility action chains, while none of the Mississauga participants used them. Why? Empirically, there are differences between the two settings, with more bicycle focused infrastructure, such as paths, traffic lights and parking areas, and a stronger general presence of bicycle use in Vejlby-Risskov, than in Clarkson-Port Credit. There also appears to be a stronger acceptance of bicycles on the road, from the car driver perspective, in Vejlby-Risskov.

In connecting themselves to needs, the Mississauga and Aarhus participants bring forward coping strategies that either enable existing mobility action chain configurations to stay open in some altered way, or establish new chain configurations. Self-regulating when and where one drives a car is an example of retaining a connection through the altering of an existing mobility action chain configuration. Not wanting to bother one's family and instead take a taxi is a coping strategy where one form of mobile with is traded for another mobile with. For some, what used to involve them proceeding and returning to home in order to address needs, now has a mobile other come to the relatively immobile person, in order to address needs. Many of the coping strategies involve negotiation, where one relies to some degree on the mobility of others. This includes asking grown children for a ride somewhere or coordinating a taxi, and attempting arrangements which may not match with their availability. For some the steps towards a possible coping strategy involves gathering information on bus and train schedules, to ascertain if the time schedule matches with their considered plans, and the associated costs. For some, in particular among the Aarhus participants, is consideration of alternative independent mobility action chains, such as walking and riding a bicycle. Here one needs to consider if the appropriate skills are in place and the factors which may be a hindrance to these skills, such as degrading eye sight, hearing and balance.

4.3 Quantitative Research

At the same time as the 18 qualitative interviews were undertaken, the interviewers asked the participants to consider their key resources, family and friend connections, the frequency of these connections and by what means the connections are achieved. The list of connections offered was based on earlier research by Fisker (2003) yet also gave participants the opportunity to add additional key connections. In both settings there were challenges to gathering up a fulsome set of quantitative data. In general, the format of quantitative inputs did not allow for a means of capturing the malleability and plasticity of the connections, as seen in the qualitative data. The participants also often did not have a clear picture of the distances they were traversing. At times some of the participants were not able to provide the names of the places they visited, such as the name of a street or the name of a shopping complex. As much quantitative data was collected as possible, in the presence of the participants. Thereafter, the interviewers utilized maps to assist in completing incomplete data, where possible.

What becomes apparent is that each participant has a very unique set of family and friend connections, which may be close or far away. In terms of resources they connect with, in both Mississauga and Aarhus, we see participants making everyday connections across similar distances. In Aarhus, many of the resource connections range from several hundred metres to 4 km. In Mississauga, the distance may be slightly further, but not to a great degree. Resource connections not of an everyday nature, such as seeing a particular medical specialist, tend to be further away.

With the sample size used in this research, no attempt at deeper statistical analysis has been undertaken. The data in its present form assists us in seeing the unique family, friends and resource connections each networked self has in place at a given moment in time. Seeing how these connections are attempted or actualized can be seen, to a greater degree, through the notion of mobility action chains and the qualitative data. The quantitative data is included as Appendix C.

5.0   SUMMARY AND NEW KNOWLEDGE

5.1   Introduction

We began this thesis by building a theoretical frame. The underpinning of the foundation was built on past scholarly work on seniors and mobility, outside of the mobilities turn. We then made our way into the mobilities turn, with a particular focus on elements that bring forward times and situations where seniors may experience their traditional forms of mobility in jeopardy. We then turned our attention to notions of extensions of the self, the networked self and mobility action chains as a means of tracing out the particular mobility configurations that are configured and reconfigured, as a means of maintaining connections between the self and needs. As noted earlier, the building of this theoretical frame was a reiterative process. Its beginnings were formulated after conducting the review of the seniors and mobility portion of the theoretical frame and continued to evolve across the development of the mobilities turn portion of the theoretical frame and during and after the empirical, qualitative and quantitative portions of the research. Through an empirical, qualitative and quantitative case study of two settings, this research project has examined the lives of seniors who drive, who no longer drive and have remained in their traditional homes and who no longer drive and have moved from their traditional homes. The myriad of mobility action chain configurations that are created, maintained, adjusted, and reconfigured in subtle and not so subtle ways were explored. A variety of independent, mobile with and mobile other configurations were seen contributing to connecting the self with needs. Not only did we see what the mobile with and mobile other configurations looked liked, we also saw the efforts seniors put into creating, coordinating and nurturing the relationships that are associated to these configurations in order to sustain a connection to needs.

5.2   Findings

All of the participants in both settings had experienced a wide spectrum of changes and associated adjustments, across their lives. Examples include children moving out and starting families of their own, retiring from the paid work force, for some the loss of a spouse and degrading mobility skills and the associated mobility action chain reconfigurations. In a general sense, there is a stronger reliance on the car in the independent, mobile with and mobile other mobility action chain configurations of the participants from Mississauga. While a car driver, these could be seen in the form of independent mobility action chains. At the same time, in both settings, there are prominent levels of self-regulation in when they drive their cars, if still driving, in order to avoid things like bad weather and heavy traffic. When driving a car is removed from the possible mobility action chain configurations, either through their own decision making, or external pressures, or through an operational script that involves revoking of a license by

authorities, the alternative chain configurations of Mississauga participants remain highly contingent on cars and roads. While in a general sense, there was certainly a reliance, and at times a preference for car-driver mobility action chains, other mobility action chain configurations were also present and utilized. This included connections via walking, bicycles, buses and occasionally taxis. Walking, bus and bicycle use are seen and used as primary and alternative elements with mobility action chains among some of the Aarhus participants. A question arises as to what factors may be contributing to the perception of a wider spectrum of mobility action chain configurations separate from ones involving cars. This is worthy of additional research.

As this research shows, there is not always a strong connect between those planning mobilities, networks and infrastructures and an understanding of the intended users. Both communities have aging populations. As discussed earlier, those planning mobilities can be seen as contributing to a setting through design scripts and operational scripts that may intentionally, or unintentionally, give prominence to some mobility action chain configurations versus others. In so doing, certain individuals may find themselves inside, on the edges or outside a range of possible mobility action chain configurations. A rather simplified, black and white example is a senior who lives in a low density setting where cars and roads are given prominence, highly restricting or making not possible other mobility action chain configurations such as walking, cycling, riding a bus and other forms of public transit. An understanding of the full range of mobility action chain configurations being enabled, constricted or made unable, in a particular setting assists in seeing and establishing a base picture of the mobility technology-mobility infrastructure pathways that are giving prominence to certain mobility action chains while downplaying or ignoring others, and how this compares with the abilities of the population residing or traversing a particular setting in order to connect themselves with needs. This can prove beneficial in seeing forms of stratification in a particular setting. This is only the first of several steps. Having built up this understanding, one can consider what if any initiatives or policy direction should be undertaken. Questions such as what is the financial and time costs to individuals, their families and government, if individuals are unable to undertake independent mobility in order to address their needs?, can be asked. This requires consideration of the mobile with and mobile others contributing to someone's mobility and the lost potential for other activities and associated costs of these individuals. Importantly, this research has considered mobility action chains in both their physical and virtual forms. While population and setting specific, one could consider the ways virtual mobility action chains may be able to compensate for constricted or no longer available physical mobility action chains. Examples include emergency response systems and tele-health opportunities.

We can now return to the research questions set out at the beginning of this thesis and relate them to the findings.

Does the mobility and networks of seniors alter when there is a loss of automobility?

Absolutely. Through the notion of mobility action chains we can see the complex ways that connections are configured and reconfigured based on skills held centrally by the self, the resources at hand and the characteristics of the setting one is attempting to traverse, including its design and operational scripts.

If so, how is the mobility and networks of seniors altered or reshaped to compensate for a loss of automobility?

This depends on the specific setting and the considered and implemented alternatives. Here we can remind ourselves of the proposition set out at the beginning of this thesis, that the mobility an individual is able to sustain, in order to meet their needs, at a given moment in time, is related to their motility and available coping strategies, through the use of available independent, mobile with and mobile other arrangements, across mobility technologies, mobility infrastructures and the built environment, all coming together comprising the setting they are situated in and attempting to traverse. Across the two settings, Clarkson-Port Credit in Mississauga and Vejlby-Risskov in Aarhus, the participants brought forward coping strategies to ensure they remain connected to needs. The forms of coping strategies utilized varies, with the Clarkson-Port Credit participants tending to find mobile with and mobile other car based mobility action chain configurations. For the Vejlby-Risskov participants there tends to be an understanding and use of a wider spectrum of mobility technologies and mobility infrastructures, enabling a wider spectrum of possible mobility action chain configurations. In this sense, the alternative mobility action chains appear more constrained among the Clarkson-Port Credit participants, compared to the Vejlby-Risskov participants. Throughout, in both settings, the participants' chains are malleable and plastic, bringing about subtle little changes here and there, and less subtle changes, in order to configure and reconfigure connections to needs.

Do seniors with a full command of automobility consider a future without automobility? Do they have a plan of action, or coping strategy, to alter their mobility and networks, should they be faced with a loss of automobility?

Participants who drive, in Mississauga and Aarhus, responded to this inquiry in different ways. Among the Mississauga participants, the response tended to be that they would rely on family,

friends, taxis and buses, without getting into specific configurations of these alternatives, or contemplating moving as a means of reconfiguring how one connects with needs. With the Aarhus participants, there was more contemplation of specific scenarios that would enable them to remain connected to needs in some reconfigured way.

If seniors' mobility and networks are altered by a loss of automobility, in what ways are they altered or reshaped and to what extent do they compensate for a loss of automobility? More particularly:

(i)   *If a decision is made to stay in one's current home, what changes or adaptations are made to adjust, to maintain mobility and networks while no longer having automobility? Are they satisfied with the choices they have made?*

(ii)   *If a decision is made to move to alternative housing, in part to address a loss of automobility, how is that choice arrived at? Are they satisfied with the choices they have made?*

As already noted, the mobility action chains of the participants, in both Mississauga and Aarhus changed when they could no longer drive a car. In fact, mobility action chains were changing earlier, while they were still car drivers, through self-regulation and no longer having connections to paid employment. Also as already noted, the configuration of these altered mobility action chains varied, with the Mississauga participants tending to utilize more car based alternatives. The altered mobility action chains of the Aarhus participants included walking, cycling, taking a bus and also car based mobile with and mobile other configurations. Perhaps one of the more striking examples of someone attempting to stay in their own home is a fellow in Mississauga who's three daughters visit him every other day. He fully recognizes that he could not continue to live in his traditional home without the assistance of his mobile others. Others in both communities find various independent mobility, mobile with and mobile other arrangements to assist them in staying where they are. Among both the Mississauga and Aarhus participants there are examples of moves, and contemplation of moves, that would keep them in their existing neighbourhoods, in part to stay connected to needs they already have relationships with. Perhaps the most striking examples of moves are the three Mississauga residents who now reside in a retirement residence. Each of them moved from communities some distance away, in part to be closer to relatives who they see from time to time and who provide them with assistance of various sorts. With these three individuals, many of their day to day needs, such as meals, housekeeping and socializing, take place in their building, coordinated by building staff

who are a form of mobile other. As noted earlier, Fildes (2008) describes anecdotal accounts of seniors moving to a new home to minimize their need for personal car mobility and that this topic is not well researched. In this sense, we have taken steps towards an understanding of the linkages between home location decisions and mobility. In different ways, participants express levels of frustration with changes that constrain their past configurations of everyday life, yet they also express a sense that one needs to get on with things and that this is the circumstances today.

What does the loss of automobility mean to seniors' understanding of themselves as social individuals and does it change their understanding of others?

To assist us in framing the answer to this question we can consider a number of scholars' work. Firstly, there is Taylor's notion of the ongoing story of the self. Secondly, there is Goffman's presentation of the self and social scripts. And thirdly, there is Bijker and Law's notion of seamless webs. The participants are social beings who had a social life before and after being a car driver. As this formerly seamless web, through the use of mobility action chains that involves car driving, break down, new configurations are attempted in an effort to retain the ongoing story and presentation of the self. Attending social gatherings with family and friends was more effortless in the past. Social obligations could be more easily maintained. The new arrangements include new constraints. For some, the loss of ability to drive a car has resulted in a greater dependence on grown children and other relatives to assist them with their connections. The very children that they likely used to drive to school or special events are now some of the individuals assisting their parents connect with needs. In different ways participants expressed frustration with their decreasing ability to be physically mobile. This related to no longer being able to drive a car but also frustration with the alternative chain configurations. Two particular examples are worthy of highlighting. One is a lady in Mississauga who is now constantly tethered to oxygen and has regained some small sense of mobility through the use of an electric scooter. Another is a man in Aarhus who walks 300 metres to visit his wife's grave and at times experiences difficulties with the return walk home. For some there is a reluctant acceptance of the new configurations. Some recognize that they cannot see grandchildren as often as they would like due to their own mobility constraints but also the constraints and competing needs in the lives of their children and grandchildren. Yet at the same time, the participants remain social individuals. They play cards with friends, they talk with neighbours over hedgerows, neighbours assisting neighbours with meals and chores, they make new friends in their new home settings and share stories about their lives and the lives of their children and grandchildren. Some acknowledge the sense of loss in good friends having passed away and their circle of old friends getting smaller. Some express comfort in returning on a regular basis, to their hairdressers,

doctors and taxi drivers who give them the touch of extra help they appreciate. For those that are predominantly housebound and relatively immobile, they appreciate the help and conversation had with mobile others that enter into their lives.

Through a comparison of the specific case studies, are there differences in automobility, mobility and networks, in terms of their paths, flows and frequency, pre, during and post a loss of automobility?

In both settings, among the participants of this research, car based mobility action chains are prominent. As noted earlier, there is more prominence of car focused mobility action chains among the Mississauga participants, when the ability to drive a car is no longer present. Car focused mobility action chains are prominent among the Aarhus participants who drive and some who do not drive. Among the Aarhus participants there are alternative mobility action chain configurations, such as walking, riding a bicycle and taking a bus. In all cases, the post car driving mobility action chains had constraints that altered the participants' paths, flows and their frequency. For example, those getting a ride to a grocery store once a week need to plan their grocery list carefully as they cannot make a quick run to the store themselves, as they may have in the past. For those riding a bicycle, the saddlebags may not be large enough for all of their grocery goods, making it necessary to make two trips from time to time, instead of filling a large car trunk once and then heading home. Getting where one wants to go by bus may involve waiting for a transfer and visiting parts of the city that do not feel like a relatively direct route, versus a direct car ride when one feels ready to go, with no pauses for a transfer, beyond the extra stop a car driver can make with only a few seconds of advance thought.

We have seen a variety of constraints, within the self and in the broader setting, including within design scripts and operational scripts, that can limit available mobility action chains. We can also see the many complex arrangements that the participants are configuring and reconfiguring with others and how competing needs within the self and those they attempt and make arrangements with, play out. Here we are once again reminded of Hall's thoughts regarding a culture that prides itself on freedom and individuality, and that what we are describing as mobility action chains, can reveal that actors are not autonomous and are 'directly and intimately bound up in the behavior of others.' (Hall 1976, p.154)

What are the lessons for those involved in planning mobilities, networks, infrastructure and housing in existing and new communities?

In their book *Social Perspectives on Mobility*, Nielsen, Gudmundson and Thomsen (2005, p.7) note that the collection of articles have authors who have "…felt a need to explore what the 'lived world' of mobility looks like and how it works, not least to be better equipped to understand possible interventions in it." The author of this research concurs with this sense of exploration and understanding of possible interventions. This research has explored the human built socio-technical world of seniors in two settings. Chapin (1974) argues that with an understanding of what he described as 'human activity patterns', this information can be taken into account in planning and policy decisions of public investments in community facilities and the delivery of services to people. What is common to both Nielsen and colleagues and Chapin is the argument that by building an understanding of what is happening, we can determine possible appropriate planning priorities and interventions. Flyvbjerg (2001) raises a number of value questions that can be of assistance to our discussion here. These questions are (1) Where are we going?, (2) Is this desirable?, (3) What should be done?, and (4) Who gains and who loses? Flyvbjerg (2001, p.61) advises that no one is experienced or wise enough to give complete answers to all four of these questions. What he suggests can be expected from social scientists is to develop partial answers to these questions which can contribute to the ongoing dialogue about the problems and risks being faced, and what could potentially be done differently.

Let us consider where we are going. Both case study settings are experiencing aging populations. The Mississauga case study empirically presents us with a community that has been designed and developed in a way that predominantly caters to young families and car use. Consideration of density, nodes and alternative forms of mobility are now in their early stages. The Aarhus case study empirically presents us with a settlement pattern which is predominantly low density, yet has some nodes with residential density. Both communities will face a growing number of seniors who no longer drive as their populations age. In a community such as Mississauga, designed to give prominence to car based mobility action chains, one can see challenges to aging in place in the future.

Is this desirable? Put another way, is it desirable to have a portion of the population who finds themselves potentially marooned, if they cannot drive a car in a setting that gives the car prominence? How can seniors in such a situation experience continued quality of life and connect with their needs? To what degree is it desirable to have non-driving seniors leaning on the motility of others, thereby limiting their available motility to address their own needs? We can also revisit several of Hall's points of view. Firstly, is that humans cannot fully replace what has

been left out of new extensions, or mobility infrastructures for our purposes here, and that it is just as important to know what is left out of an extension system as what is extended (Hall 1976, p.37). Hall (1966, p.188) also notes that humans need to pay more attention to the kind of extensions that are created, not only for those that may easily use them, but also for others for whom these extensions may be 'ill suited'.

What should be done? Not an easy question to answer in a global sense, as this research is specific to a small group of seniors in two specific case study settings. Further research could be conducted to investigate if similar findings are found in other settings. The over-simplified answer is ensure that those who do not drive a car have alternative ways of connecting with their needs, and retain a quality of life. This is not to suggest that there needs to be equity of available mobility action chains. If a range of diverse and possible mobility action chains are available, then there is a greater likelihood that those who are not able to use one particular mobility action chain configuration can consider and utilize alternative chain configurations. This can be accomplished across a range of possible interventions, such as encouraging more walkable nodes where housing and everyday resources are a short walk apart, or ensuring that mobility infrastructures such as bicycle paths, pedestrian friendly paths in and out of shopping areas and bus routes that offer routing, scheduling and transfer times that reduce journey times, are in place and reducing possible frictions with car driver-road based mobility action chains. Some of these possibilities have been alluded to in the City of Mississauga's new strategic plan and in the World Health Organization's age friendly cities initiative. A more detailed answer, is to build upon Hall's notions and fully consider a wide breadth of extensions and mobility action chains, to consider various selves, with diverse skills, capabilities and constraints, in planning mobilities, networks, infrastructures and housing. In this sense, efforts can be taken to avoid the potentially narrow view of planner's and policy maker's 'imagined types of citizens' (Richardson and Jensen 2008, p.220), versus the wide spectrum of types of citizens living, working, socializing and connecting with needs across particular settings.

Who gains and who loses? In a setting that gives prominence to car based mobility action chains, those who are car drivers gain. Those who are not car drivers need to find alternative mobility action chain configurations, which do not have the degree of flexibility that the combination of a car in a stand by position, together with holding a valid driver's license and skills to drive a car, offer. In a setting that enables a range of mobility action chain configurations, such as car based, bus based, bicycle based and walking based, a wider spectrum of possible chains, towards connecting with needs, is possible. Here a wider spectrum of people, with different needs and skills gain, in the sense that there are alternative mobility action chain configurations which can be established, if a car-driver based chain is not available. There is also a time and

demographic element to this. As populations continue to age, in settings that give prominence to car based mobility action chains, there will be growth in the number of people who lose.

5.3   Summary and New Knowledge

We have now had an opportunity to consider the theoretical frame and findings of the empirical, qualitative and quantitative investigations. Several notions have been introduced to the mobilities turn, through the theoretical frame and applied through the empirical, qualitative and quantitative investigations. The notion of the naked self has been introduced as a means of seeing the many complex ways humans build up connections that utilize mobility technologies and mobility infrastructures. These elements, coming together enable a view of the extensions of the self, as a means of seeing the many complex ways that connections are configured and reconfigured, in an everyday sense and across the life-course. This notion adds one possible way of considering Jensen's (2010) networked self. Jensen (2010) introduced the notion of the mobile with, as a means of seeing various forms of fleeting through to formalized, routine and collaborative arrangements with others, contributing to one's mobility. The research at hand has opened up a view of mobile withs that seniors plan and construct with others. Here we have introduced a new notion – the mobile other, being individuals who through the use of their mobility and motility utilize mobility action chains that bring needs towards those who are predominantly immobile. These mobile others include family and home care providers visiting housebound seniors, or the staff who come to a work place to serve the needs of a group of people who are predominantly immobile, such as in a retirement residence, nursing home, or total institution in Goffman's terminology.

Using a mobility action chain approach one can look to how decisions are made and implemented regarding the configuring, sustaining, consideration and implementation of coping strategies and associated reconfiguration of connections with needs. We can also look to how competing needs of the self and those they attempt to, and do, form mobility action chains with, are addressed within mobile with and mobile other arrangements. The notion of mobility action chains may contribute to discussions of the 'locked in' nature of car use, in order to better see how different users, such as children, adults, seniors who drive and those who do not, are all dependent on car based mobility action chains in settings where it is perceived that there are no acceptable alternative chain configurations. By considering the mobility action chains of a wide spectrum of mobility performers, we can see the 'alternative' (Vannini 2009) mobilities that often go unnoticed.

Additional new knowledge introduced through this research project is the notion of operational scripts. Within a given setting there can be individuals, with social scripts, using mobility technologies and mobility infrastructures as part of their mobility action chains, encountering design scripts. At the same time, within a setting there can be some sense of a general understanding of the various possible roles and who can and cannot have a role. An example are rules setting out who can and cannot hold a driver's license and associated rights and privileges to drive a car. Through a general understanding of a particular operational script, those traversing a setting have a sense of what is possible, not possible and the acceptable levels of variance and the potential repercussions of not staying within the operational script. An example is a senior who no longer drives a car on busy highways or rush hour, yet continues to have comfort and understanding of the operational script involving a car and road arrangement in some local, quiet setting. One of the Mississauga participants describes a situation where she found herself and her car on a curb, which is not where she had intended to be. The operational script at that moment, and in this particular setting, was temporarily broken. Other drivers gave her space, without the pressure of horns honking, to sort herself out and come back into script. The participant, recognizing her inability to stay within the boundaries of the script, drove home and decided to not drive from that point on.

Both Aaharon and Urry have touched on needs within their research on mobilities. Mobility action chains, as presented in this research project, uses needs as a means of anchoring the complex connections to the self. To some degree this has presented the ability to see competing needs within the self and among those they develop arrangements with. This is an area that could be pursued further in future research.

Mobility action chains, as presented here, demonstrates the fluidity and plasticity of the connections between the self and needs. In general, we see the self continuously reaching towards needs. The form of these connections evolves in an everyday sense and across the life-course. Skills held by the self are gathered over time and may degrade or collapse completely later in life. The particular needs the self is seeking to reach is also changing across the life-course. The self can be seen experiencing moments of relative immobility and mobility and configuring different forms of mobility action chains based in part on holding skills related to, and access to, mobility technologies and mobility infrastructures.

Mobility action chains was developed over the course of this PhD research project. In tandem with its use in this thesis, the mobility action chain concept was also tested, probed and presented, across a number of conference papers. These papers considered mobility action chains across a variety of settings and scales. As noted earlier, the development of the

theoretical frame for this research project was a reiterative process. As data was collected it was tested through its application of the mobility action chain concept. Through its application in this research project, in the next section a number of next steps are proposed which included developing the concept further.

6.0   RECOMMENDATIONS

6.1   Introduction

Having undertaken this research project, having built up a theoretical frame and presentation of the findings across the empirical, qualitative and quantitative research, specific research questions have been answered as best as possible, yet using the approach that has been taken, additional questions and areas worthy of inquiry have presented themselves. These areas considered worthy of research are noted here.

6.2   Proposed Next Steps

With this initial foundational understanding of mobility action chains in place, we can begin to explore in greater detail the complexities of serial chains, in the form of varying configurations, which may be required, in order to bring about a connection with needs, to better understand the connections between the self and needs. This may include investigating where a mobility action chain transitions from one set of design and operational scripts to a different set of design and operational scripts, and how seamless, or non-seamless is the ability to carry on with the chain. An example is where one jumps across mobility infrastructures designed, built and managed by different entities holding different goals and objectives. We can also begin to layer in, in more detail, characteristics of the physical and virtual movements, spatialities, temporalities, social, and materialities of particular selves and their mobility action chains, as a whole representing configurations and reconfigurations of the self. This research project touched on the constraining nature of connections. Future research can more fully probe the influence and relationship between social scripts (Goffman 1959), design scripts (Akrich 1992, Latour 1992), and operational scripts (Goffman 2009) that mobility action chains encounter and traverse.

Applying the notion of mobility action chains to similar self types, attempting connections to needs in varying built environments, with varying available mobility technologies and mobility infrastructures would also be worthy of investigation. By examining a number of different types, across the life-course, attempting mobility action chains across a common setting, or settings, we can begin to consider more fully, and attempt to build up, an understanding of various forms of stratification (Bauman 1998) and segregated mobility patterns (Jensen 2007).

In the two case study settings investigated, a question arises as to what factors may be contributing to the perception of a wider spectrum of mobility action chain configurations, separate from ones involving cars, in the Aarhus setting, when compared to the Mississauga

setting. Whether non-car focused mobility action chains are possible in the Mississauga setting raises interesting questions. Is there a bus network in the Clarkson-Port Credit setting? Most certainly. Did the Mississauga participants have past experiences using buses? Little or none. This is an area that would be worthy of additional research. This could be accomplished through further qualitative and empirical research in the two settings, where participants are probed on their past and present experiences with non-car based mobility action chains and empirically investigate bus, bicycle and walking networks systems and infrastructures.

In terms of walking, the walking distance to resources, such as grocery stores and pharmacies, appear somewhat similar, yet Aarhus participants describe walking to a greater degree. Why? From the empirical research it was found that shops in Clarkson-Port Credit have larger parking lots that a pedestrian needs to cross as part of a walking based mobility action chain, compared to Vejlby-Risskov. Perhaps this is a contributing factor, but more research is required in order to investigate this fully.

Both Aaharon and Urry have touched on needs within their research on mobilities. Mobility action chains, as presented in this research project, uses needs as a means of anchoring the complex connections to the self. To some degree this has presented the ability to see competing needs within the self and among those they develop arrangements with. This is an area that could be pursued further in future research. Research of this nature would potentially include qualitative research among different age groupings or a specific family, in order to see the intergenerational nature of mobility arrangements. Also regarding needs, this research has not delved into the distinction between need versus want to any great degree (see Schwartz 1996 for one example of setting out the distinction). This could be another area of additional research, probing whether the mobility a person is seeking out is tied to what is truly a need versus what one wants. This may bring forward some of the thoughts of Ignatieff where as time marches on and various elements change, what at first was originally the way of a small group, becomes the accepted way of a large group and perhaps what at first was a want evolves into a need.

Some of the Mississauga participants in the research at hand live in a retirement residence. A fulsome investigation of a total institution, such as a retirement residence, or a long-term care home, where one investigates the mobilities of the residents, the workers, the families and others who contribute to life in and associated with a building of relatively immobile individuals, is worthy of consideration in the future.

Some of the participants in this research noted resources that used to be physically in close proximity and have since left their neighbourhoods. Having previously investigated this, to some extent (Fisker 2003) outside of the mobilities turn and in a rural setting, it would be a worthwhile pursuit to consider this within a mobilities turn context to see the impact this has on seniors' mobilities and connections.

The two specific case study settings considered in this research are relatively established neighbourhoods, versus being dispersed suburbs on the edge of existing built up areas. The approach taken in this research could be applied to more urban, such as city centres, and less urban settings, towards seeing what similarities and differences come forward.

And finally, based on the research undertaken for this project, including testing and probing notions that have been developed at various conferences, an opportunity exists to have some of these works refined to a form where they could be published in journals or books. One of these papers, first presented at the first Pan-American Mobilities Network conference, held in Victoria, British Columbia in April 2010, will appear in a forthcoming book. These publishing opportunities will provide further opportunities to probe and test the notions developed herein, apply them to different settings and obtain comments from other scholars who may be undertaking similar research.

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8   APPENDICES

A – Interview Guide for Qualitative and Quantitative Data Collection (on memory stick)

B – Qualitative Interview Transcripts (on memory stick)

C – Quantitative Data (on memory stick)

D – Photographs and Images of the Case Study Settings (on memory stick)