

Loughborough University

The application and development of inclusive service design
in the context of a bus service

A Doctoral Thesis
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Abstract

This thesis investigates the design of inclusive services by integrating theory and approaches from the domains of Service Design and Inclusive Design. This integration was used to evaluate bus service use by younger and older people and the role of other stakeholders. The research was carried out through the case study of the bus service in Guadalajara, Mexico. As a result of this research, an inclusive service design approach and a tool are proposed to guide the design of inclusive services.

Using an inclusive service design approach led to the application of a mixed methodology for data collection, which included: 1) a series of individual and group interviews with stakeholders as well as a document analysis; 2) structured focus groups with younger and older people; 3) observation of younger and older passengers using the service; and 4) accompanied journeys with older people. Data were analysed using both qualitative and quantitative techniques, and the results facilitated 1) the understanding of the service operation; 2) the identification of the main barriers for interaction with the service along a door-to-door journey; and 3) the determination of the gap between what younger and older users need and desire and what bus operators actually provide.

The research then focussed on visualising and communicating the findings to stakeholders. An inclusive service blueprint was developed to graphically represent the level of difficulty in using the service by younger and older people across the door-to-door journey, and to highlight areas for service improvements. A final study was undertaken to assess the usefulness of the inclusive service approach and the blueprint in improving the bus service.

Collectively, the findings indicate that integrating inclusive principles along with a Service Design approach provided several benefits in investigating and improving the bus service. The uniqueness of data generated by younger and older users and the understanding of inclusive principles by the stakeholders already shows the potential to lead to a more inclusive service given the activities now happening in Guadalajara.

This research contributes to the discussion of how the design of services can evolve through the incorporation of inclusive principles in the design process. Whilst the research was undertaken in the context of the bus service in Guadalajara, the approach and some outcomes from this research may be applicable for designing inclusive services in other contexts around the world.

Keywords: inclusive services, Inclusive Design, Service Design, Human Factors, inclusive service design, younger and older people, inclusive service blueprint, bus service, public transport

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For Marisela, Carlitos, and Oliver

And for our parents and grandparents who have taught us
the value of the human dignity

With Love

Publications

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*'We should consider what we mean by human dignity
and how all of the products that we make either succeed or fail
to support and advance human dignity'*

(Richard Buchanan, 2001)

Chapter 1 Introduction

1.1 The need for inclusive services

This research is undertaken in the context of the ageing population, which highlights the need to help people age well through of the provision of enabling and supportive environments. The United Nations (2002) argues that the ageing population is the process by which older individuals become a proportionally larger portion of the total population. Data from this organisation indicates that in 2009 there were an estimated 737 million persons aged 60 years or over. This number is projected to increase to 2 billion in 2050, by which time it is expected that there will be more older people than children aged 14 and less (United Nations, 2009). Figure 1.1 and Figure 1.2 show the ageing trend of the world population from 2009 to 2050 respectively.

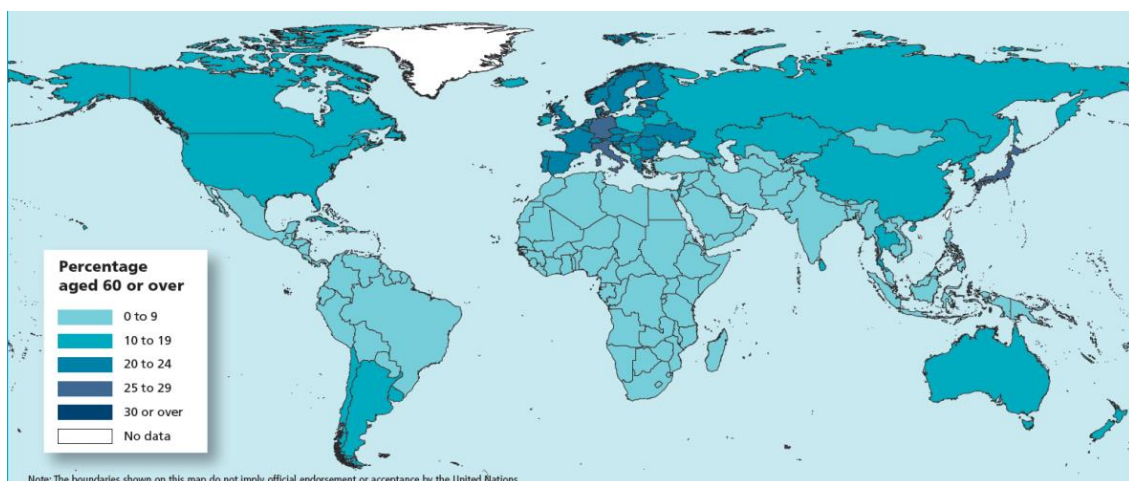


Figure 1.1 Percentage of total population aged 60 and over 2009 (United Nations, 2009)

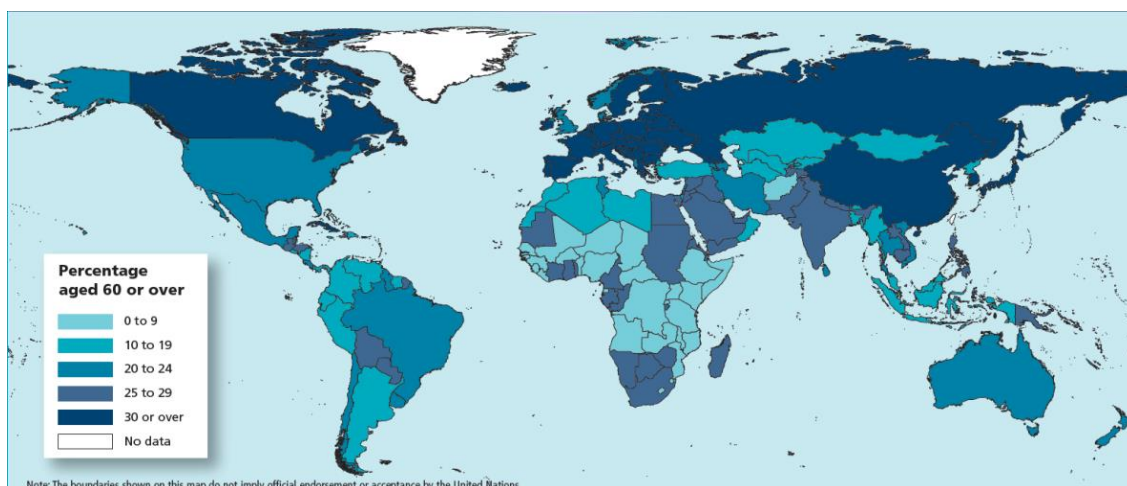


Figure 1.2 Percentage of total population aged 60 and over 2050 (United Nations, 2009)

It can be observed from the figures above that the distribution of older people worldwide is not identical across all regions; the percentage of older persons is currently higher in developed countries, e.g. in Europe one in five is already aged 60 or over, whereas the proportion in Asia or Latin America is one in ten. However, population ageing is growing more rapidly in developing countries than in developed ones (United Nations, 2009, 2013). This trend is illustrated in Figure 1.3 where data suggests that while the percentage of older people in developed regions is expected to increase from 21.4 in 2009 to 32.6 in 2050, the percentage in developing regions is expected to rise from 8.5 to 20.2 in the same period of time.

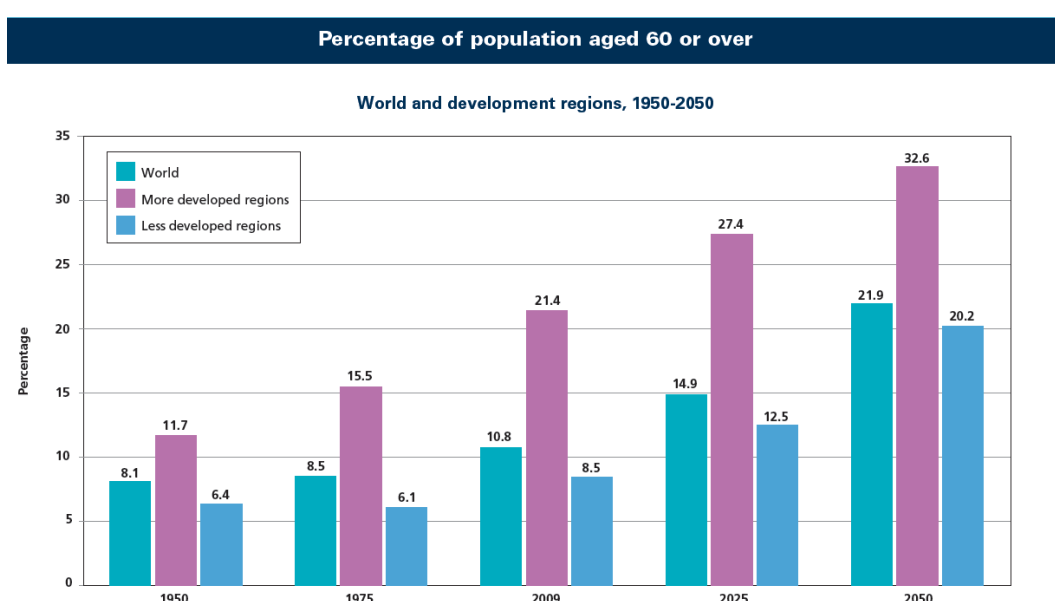


Figure 1.3 Percentage of population aged 60 and over, World and development regions, 1950-2050 (United Nations, 2009)

This demographic trend has been recognised as one of humanity's greatest triumphs. However, it is also one of its greatest challenges since global ageing will increase economic and social demands on all countries (WHO, 2002). Moreover, due to the different levels of economic development in the worldwide regions, this impact is expected to be higher in developing countries where there will be less time to adjust to the consequences of this demographic change (United Nations, 2010). Consequently, the World Health Organization claims that 'in all countries, and in developing countries in particular, measures to help older people remain healthy and active are a necessity, not a luxury' (WHO, 2002:6).

Great improvements in supporting an ageing population have been made, especially in developed countries, through legislative imperatives - such as The Disability Discrimination Act (DDA, 1995) (now replaced by The Equality Act, 2010) and The Americans with Disabilities Act (ADA, 1990). Nevertheless, access to outdoor spaces and buildings is not fully guaranteed for people with varying needs and capacities. According to the World Health Organization (WHO, 2007:15) 'in both developed and developing countries, people think that their city was not designed for older people' and they also report that the provision of commercial and public services presents problems in meeting older people's needs. Data from this report suggested that along with the need for an accessible built environment, there is a compelling need for inclusive services that can be used by a broader range of users. Services, in which providers are able to understand how they can better respond to users irrespective their age or capabilities (BS 18477, 2010; WHO, 2007), therefore need to be developed. The evaluation and design of inclusive services are of particular interest in this thesis.

1.2 Designing for Inclusive Services

There is not a single definition for service or services, however Edvardsson, Gustafsson, & Roos (2005) found that service definitions frequently include concepts such as activities, deeds, processes, performance, interactions, experiences, and solutions to customer problems. These authors highlight that most academics emphasise the process nature of services. Vargo & Lusch (2004:2) define service as 'the application of competences (knowledge and skills) by one entity for the benefit of another'. Generally, a service can be understood as a process which involves people, environments and products. In this process service providers offer a solution to service users, who return

value back to the service providers, usually in terms of money. Figure 1.4 helps to illustrate this service relationship, showing the elements involved in a service provision.

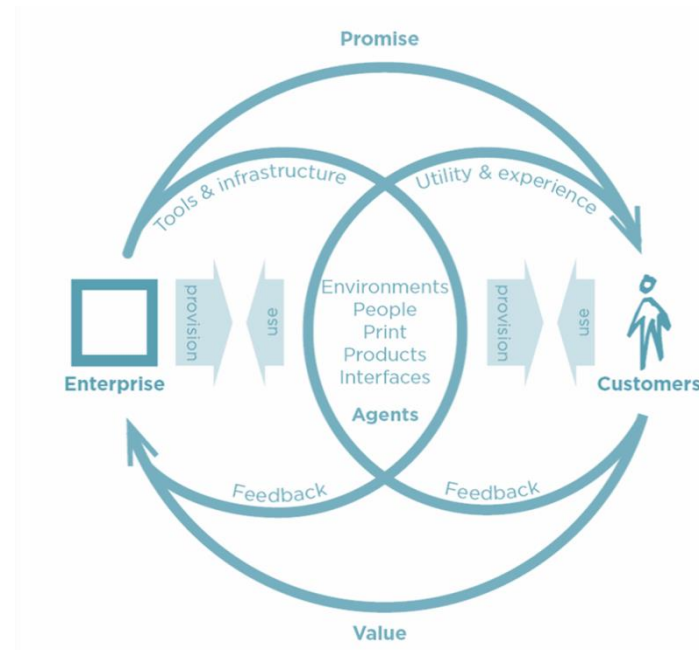


Figure 1.4 A model of service relationship (Polaine, Løvlie, & Reason, 2013)

Inclusive services are those which are available, usable and accessible to all customers equally, regardless of their personal circumstances (BS 18477, 2010). The growing need for inclusive services represents a challenge for the design disciplines in terms of providing knowledge and tools for the evaluation, design and improvement of such type of services. With this in mind, from the outset of this research, the integration of theory and methods of Service Design and Inclusive Design (both outlined below) has been the route proposed to guide the evaluation and design of inclusive services.

Service Design is an emerging discipline that aims to innovate or improve services that are useful, usable and desirable from the user perspective, and efficient and effective from the organisations perspective (Mager and Sung, 2011; Moritz, 2005). Literature suggests that the emerging discipline of Service Design provides several benefits to the end users' experience when applied to service sectors as retail, banking, transportation, and healthcare (Stickdorn, 2010b). In the public services arena, it has been pointed out that the approach is less about competition and contestability and more about reducing

the gap between what organisations do and what users expect or need (Parker and Heapy, 2006).

Meroni and Sangiorgi (2011) highlight that Service Design, since its origins, has considered the users as its main focus in the process of service delivery. These authors claim that this approach generally conceives users as a resource rather than a burden or a problem. Still, beyond being a user-centred approach, it is also considered as a human-centred approach that investigates or understands people's experiences (as users, service staff, communities or humanity in a wider sense), interactions and practices 'as a main source of inspiration for redesigning or imagining new services' (Meroni and Sangiorgi, 2011:203). However, this design approach is limited in terms of evaluating and designing inclusive services, since there is not an explicit consideration that users are diverse and possess a variety of capabilities, needs, and desires.

Inclusive Design 'is a general approach to designing in which designers ensure that their products and services address the needs of the widest possible audience, irrespective of age or ability' (Design Council, 2008). One of the main objectives of this approach is avoiding design exclusion, which might be caused if the demands of the task exceed any of the corresponding user abilities (Clarkson, Waller, and Cardoso, 2013). Furthermore, a key characteristic of Inclusive Design is to increase the target group of a product or service, but without compromising the business goals of profit and customer satisfaction (Coleman et al., 2003).

Inclusive Design has been developed over the last 20 years in the UK. Among its research contributions are theoretical models, data on different user capabilities, methods and tools, as well as standards and guidelines (Clarkson & Coleman, 2013). Research from this design approach is mainly divided into two areas 1) understanding capabilities and needs of the end users and b) understanding the needs of information of the knowledge users (e.g. designers, policy makers, industries, etc.) (Dong, McGinley, Nickpour, & Cifter, 2013). Overall, Inclusive Design offers several benefits when designing for inclusion. However, it appears that much research of this design approach has focused on the end users and on the design of products.

In essence both approaches are closely related to the notion of develop better services. Whilst Service Design provides principles to deal with a human-centred and holistic perspective, Inclusive Design offers a strong focus on users' diversity. Consequently,

this thesis is underpinned on the idea that using philosophical principles, tools and techniques coming from these design approaches, guided by a Human Factors perspective, can contribute to designing better services. This research project was undertaken to explore possible ways of integration between them, and use the results for encouraging the design of inclusive services.

1.3 Research Context

Transport, and particularly public transport, is one of the services that have been identified as specially relevant in supporting older people to remain healthy and active (WHO, 2002). A number of studies highlight the benefits of continued mobility and use of transport for older people, including health and well-being (Metz, 2003; Mollenkopf, Marcellini, Rouppila, Szeman, & Tacke, 2005; Webber, Porter, & Menec, 2010). Conversely, a lack of adequate public transport can result in increased isolation and ‘the denial of a range of human rights, including participation and equitable access to services’ (United Nations Population Fund, 2012). Despite the potential benefits of public transport, there are barriers relating to accessibility and use for all passengers and older and disabled people in particular. The World Health Organization (WHO, 2007) specifically highlights how services such as transport have difficulty in meeting the needs of older citizens.

There have been several studies of the difficulties faced by older bus passengers in the *developed* world. These have identified physical issues related to boarding, alighting, route design, fear of falling, and wider issues to do with service operation and availability - e.g. Rogers, Meyer, Walker, & Fisk (1998); Davey (2006); Nickpour, Jordan, & Dong (2012). Fewer studies have investigated older passenger bus use in the *developing* world. An extensive study by the World Health Organization (2007) found a range of issues for older bus users in the developing world, including unreliable service, high steps, lack of respect for priority seating, insensitivity of drivers, and crowded buses. This results in a reduction in quality of life, since public transport is the main mean of transport of older people in these countries (Ipingbemi, 2010).

In a rare direct comparison of older and younger passenger experiences, Broome, Nalder, Worrall, & Boldy (2010) found differences in priorities for critical bus use barriers and facilitators, and also how these were perceived and described. The attitude and behaviour of the bus driver was of far greater importance to the older passengers.

Despite the work above, there is a lack of objective research comparing explicitly older and younger passenger experiences within the developing world. This results in difficulty in attributing older passengers' difficulties to the physical limitations induced by ageing, or the characteristics of the bus service (which would impact, at least to some extent, on all passengers). Service stakeholders (who include drivers, bus operators, bus manufacturers, designers and regulators) will be younger than their pension-aged passengers, and are unlikely to directly experience for themselves the challenges such passengers face in using the bus. In addition, most of these stakeholders (aside from the drivers) are not in direct contact with such passengers and cannot identify where aspects of the service impact specifically on older passengers.

From a methodological perspective, the vast majority of reported studies have used self-report methods (e.g. interviews, focus groups and surveys) as the primary source of data. Although these are useful, they lack the objectivity in data collection that is desirable, particularly in terms of presenting evidence to stakeholders to promote service improvement. Johnson et al. (2010) highlight how views stated in relation to subjective experience, while important, might be affected by educational, cultural or social differences. In contrast, performance observations or measures allow an objective assessment of passengers' behaviour and a comprehensive view of the variation between population groups (Sainio et al., 2006).

This thesis seeks to tackle these research gaps. Consequently, the bus service in Guadalajara was used as the research application domain. Guadalajara is second largest city in Mexico, and is a typical city in the developing world. The bus service is operated under a lack of regulatory and legislative regimes, which means that there is little incentive for the transport operators to provide what passengers need or expect. It is common that bus operators compete instead of collaborating to provide the service, which results in bus drivers in direct competition with each other to maximise passenger numbers per bus. Such situation usually causes crowded buses and driving styles that are unsafe and uncomfortable for passengers, particularly for older ones.

The research presented in this thesis is limited to investigating younger and older people's experiences in using the bus service, with a stronger focus on older people. It is recognised that the focus of Inclusive Design comprises a broader range of users, namely disabled people, pregnant women, children, among others. However as stated at

the beginning of this chapter, the increasing number of older people highlights the focus on the needs of this age group. Furthermore, in some scenarios older people comprise similar conditions than other groups of users, i.e. they can experience limitations of their physical or cognitive capabilities.

1.4 Aims and objectives

This research aims to contribute to the evaluation and design of ‘inclusive services’. Specifically the aims of this thesis are 1) to explore and evaluate the design of inclusive services by integrating theory and approaches from the domains of Service Design and Inclusive Design; and 2) contribute to the bus service improvement in Guadalajara through applying the inclusive service design approach. In order to achieve this, the research was guided by the following objectives:

1. To explore possible ways of integrating theory and methods from the domains of Service Design and Inclusive Design for the evaluation and design of better services.
2. To identify the key issues that prevent the bus service being safe, usable and desirable for passengers, and the demand that these issues place on younger and older users.
3. To develop, test and evaluate a practical visualisation tool that can be used to communicate the younger and older users’ differences to designers and stakeholders in order to help in designing inclusive services.
4. To explore how inclusive service design can be potentially useful for service improvement in the context of the bus service in Guadalajara, Mexico.

1.5 Research questions

The following three research questions are investigated in this thesis:

1. What are the theoretical and methodological elements of Inclusive Design and Service Design that can be integrated to contribute to evaluating and designing for inclusive services?
2. What are the issues that prevent the bus service being safe, usable and desirable for passengers, and what is the demand that these issues place on younger and older users?

3. How can Service Design and Inclusive Design help to represent users' capabilities, needs and expectations and contribute to design for inclusive services?

1.6 Research stages

The Inclusive Design waterfall model (Clarkson, Coleman, Hosking, & Waller, 2007) provides a useful tool to visualise the design process to successfully satisfy the real user needs (see Figure 1.5). It comprises four steps:

Discover - the systematic exploration of the perceived need to ensure the right design challenge is addressed, with due consideration of all stakeholders; the outcome of this step is: an understanding of the real need;

Translate –the conversion of this understanding into a categorised, complete and well defined description of the design intent; the outcome of this step is: a requirements specification;

Create –the creation of preliminary concepts that are evaluated against the requirements; the outcome of this step is: concepts;

Develop –the detailed design of the final product or service, ready to be manufactured or implemented; the outcome of this step is: solutions.

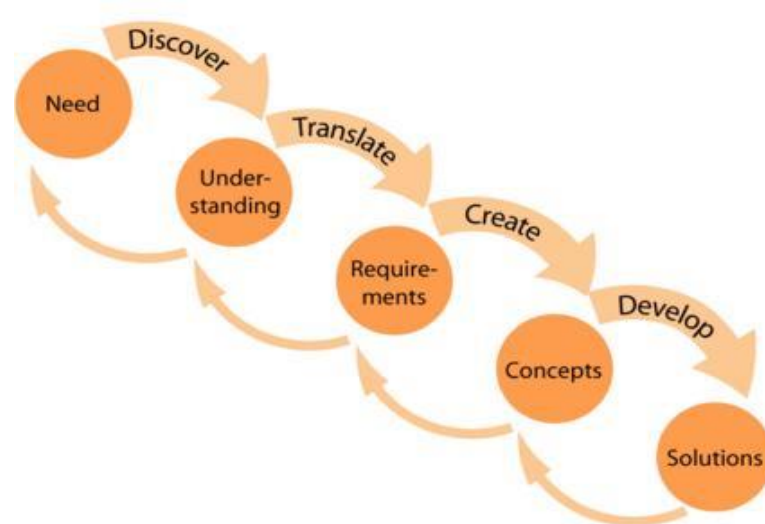


Figure 1.5 The Inclusive Design waterfall model (Clarkson et al., 2007)

The above model was used as a guideline in this thesis and the following two steps were delineated to achieve the objectives and tackle the research questions:

Discover

- Understand theoretical and methodological approaches of Service Design and Inclusive Design, in order to integrate the inclusive service approach for this research.
 - ✓ Literature review (Chapter 2)
- Explore the gaps in the research concerning ageing and bus use, in order to develop the research approach to investigate the design of inclusive bus services
 - ✓ Literature review (Chapter 2)
 - ✓ Research approach (Chapter 3)
- Understand the elements of context that might negatively impact the bus service operation
 - ✓ Study 1 (Chapter 4)
- Understand the issues that prevent the bus service being safe, usable and desirable, and ascertaining the demand that these issues place on younger and older users
 - ✓ Literature review (Chapter 2)
 - ✓ Study 1 (Chapter 4)
 - ✓ Study 2 (Chapter 5)
 - ✓ Study 3 (Chapter 6)
 - ✓ Study 4 (Chapter 7)

Translate

- Use empirical data from the four previous studies to develop an inclusive visualisation tool that can be used by designers and stakeholders when designing for better services
 - ✓ Inclusive service blueprint (Chapter 8)
- Implement workshops with stakeholders to evaluate the potential usefulness of the inclusive service approach in improving the bus service in Guadalajara, as well as the usefulness of the inclusive service blueprint in communicating users' differences.
 - ✓ Study 5 (Chapter 9)

1.7 Thesis outline

The thesis comprises a further ten chapters, whose contents are summarised below.

Chapter 2 reviews the literature that provided the foundation to this research and is divided in three sections. The first section reviews previous knowledge on ageing and public transport, with particular emphasis on finding out the barriers in using the bus by older people, and the requirements for the provision of inclusive bus services. The second section describes the theory and current practices of Service Design and Inclusive Design approaches. Finally, the chapter explores how these approaches can be integrated, and proposes this integration to guide the evaluation and design of better services.

Chapter 3 introduces the approach selected for undertaking this project. The mixed methods approach is presented as an option that strategically combines qualitative and quantitative methods to enable complementary strengths and reduce weaknesses when carrying out research projects in the ‘real world’. This chapter then describes the research questions and the methods used to tackle them.

Chapter 4 reports the methods and results of the first empirical study, undertaken to understand the context in which the bus service was operating. Using interviews with stakeholders and documentary analysis, it was determined that the poor quality of the service discourages use of it not only for older people but for most users in the city. It became apparent this situation arises because 1) the lack of a regulatory and legislative regime to incentivise the provision of a good quality transport; 2) the existence of a "informal" system of buses, which results in drivers being paid directly out of the fares they collect, and therefore pressures to pick up as many passengers, as quickly as possible; 3) the lack of support from service operators (backstage) towards drivers (frontline staff).

Chapter 5 describes a focus group study with younger and older people conducted to investigate the issues that impose greatest difficulty in using the service and their impact on younger and older people experience. Based on the participants’ self-reports, it transpired that each group of participants prioritised differently the issues that impose greatest difficulties. It also emerged that younger and older passengers were affected differently by these limitations in the service. Personal safety and usability problems were stated as the most cause of concern for older participants, while comfort was

reported as the main adverse impact for younger participants. These findings supported the idea that given the demands imposed by the bus service and the reduced capabilities associated with ageing, the gap between what users need and want and what the service provider offers was wider for older people.

Chapter 6 delineates a series of journey observations conducted to ascertain the differences in the gap between the personal abilities of these groups of passengers and the demand that using the bus exerts. The use of an observational method enabled an understanding of the behaviours of passengers, as influenced by the design and operation of the wider aspects of the bus service. The findings highlighted the presence of a wider gap in capability that occurs with older users based on the demand that the bus service imposes. The study was able to observe behaviour on buses, but not to investigate other barriers related to the door to door experience.

Chapter 7 reports a study that comprised a series of accompanied door-to-door journeys undertaken to understand the barriers at each point of interaction that older people face when using the bus service. This study defines more precisely the nature of difficulties encountered over the entire journey process. The study provided three outputs; firstly, it identified a list of tasks that the users perform when using the bus service and a series of interaction (touch) points relating to user action and stage of the journey. Secondly, based on what participants said and what they were observed doing during the study identified the main barriers that these participants faced and the underlying reasons. Subsequently, the analysis of the barriers allowed their categorisation into physical, psychosocial, and operation causes.

Chapter 8 outlines the development of the *inclusive* service blueprint. The chapter begins with a synthesis of the evidence from the earlier studies that was for the blueprint development, followed by the description of the procedure used to create this version of blueprint. The final version of this tool is presented at the end of the chapter.

Chapter 9 describes the rationale, development and results of a series of workshops with bus service stakeholders. These workshops were designed to assess the usefulness of (1) the inclusive service design *approach* for analysing and enhancing the bus service and additionally (2) the inclusive service *blueprint* for communicating results from the descriptive studies. The results lead to a conclusion that the inclusive service

approach and the blueprint tool have the potential for supporting the bus service improvement.

Chapter 10 discusses the main findings in relation to the differences between younger and older passengers, the gap between what they need from a service and what the bus operators provide, and the implications for designing a better public transport system. It then discusses the benefits of using the inclusive service design approach and the blueprint tool in designing and improving services. The chapter also provides a discussion of how the approach and tool can be transferable in designing other sorts of services in different contexts globally. Likewise it discusses how Service Design and Inclusive Design communities might benefit from the integration of theory and practice from each domain. The discussion chapter finishes with a consideration of the lessons learnt from the methodology applied in this research, its benefits and challenges and limitations.

Chapter 11 concludes this thesis connecting the overall findings to the research aims and objectives. The chapter describes what are considered the main contributions of this research and identifies areas for future work.

The structure of the thesis is shown below in Figure 1.7. Figure 1.7 indicates the relationship between the research questions posed within the thesis, existing knowledge, and the studies undertaken to address specific research questions.

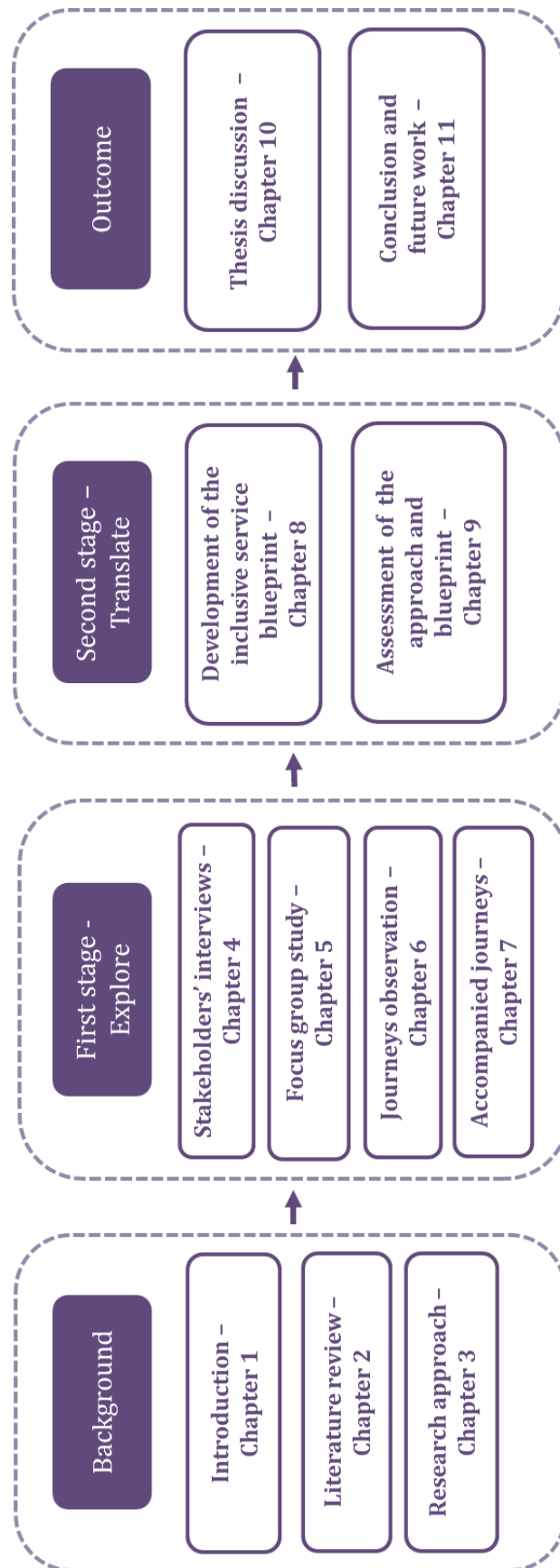


Figure 1.6 Thesis outline

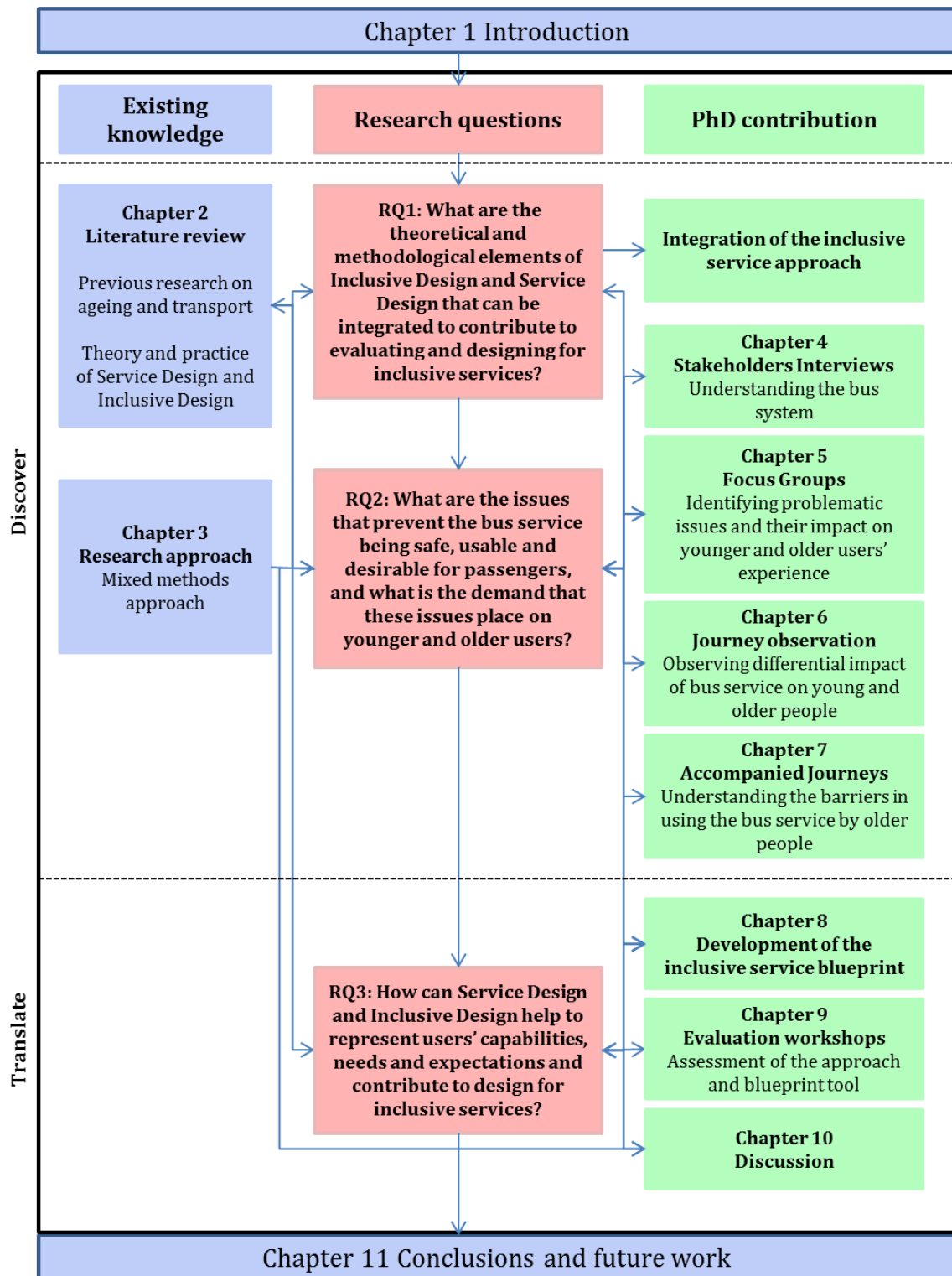


Figure 1.7 Thesis outline, research questions and PhD contributions

Chapter 2 Literature Review

2.1 Introduction

As discussed in the introduction, an ageing population has highlighted the need for products, services and environments that meet older people's needs. The aim of the thesis then is to contribute to the design of inclusive services by taking advantage of potential contributions arising from the integration of Service Design and Inclusive Design approaches. At the outset of this research, it was assumed that combining philosophies, principles, tools and techniques from these approaches, guided by a Human Factors perspective, might maximise benefits in designing for inclusive services. A bus service was selected as example to highlight the benefits of this inclusive service approach.

The literature review therefore contains three sections which comprise the background to this research. It begins by introducing relevant guidelines for designing accessible bus services and summarises studies on ageing and transport. Afterwards, it describes the fundamentals of Service Design and Inclusive Design approaches and then it discusses how these approaches can contribute to designing inclusive services.

Figure 2.1 illustrates the literature review in a schematic way, presenting the main areas of knowledge that fed the research. It should be noted that the figure suggests that the Human Factors perspective is underpinning this research project.

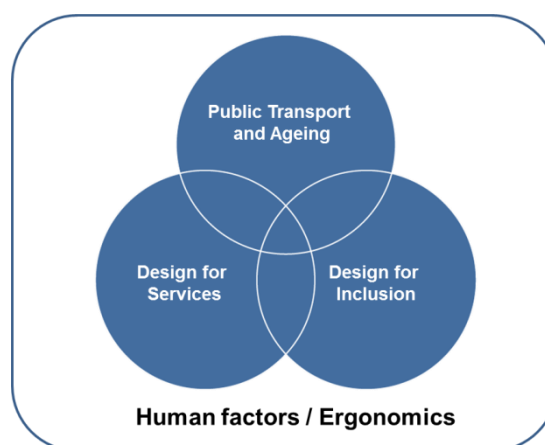


Figure 2.1 Literature review diagram

At the end of each section a summary of the main theoretical and methodological implications for the remainder of the thesis is provided.

2.2 Role of transport services in the era of an ageing population

2.2.1 Transport and quality of life

As stated in the introduction, public transport is one of those services that are key in allowing 'active ageing' and therefore better quality of life for older people (WHO, 2007). In recent years, there has been an increasing amount of literature associated with mobility and transport relating to well-being and quality of life. Mobility in old age has been defined as a complex phenomenon, which has two components: a) it is the physical ability to move; and b) it is the realisation of all types of trips outside the home, either by foot or using any means of transport (Mollenkopf et al., 2005). Its relevance is that it enables people to undertake their daily activities, make use of neighbourhood facilities and access health care. It also delays the onset of disabilities and postpones frailty; contributes to subjective well-being and life satisfaction, as well as reducing levels of institutionalisation (Metz, 2000, 2003; Mollenkopf et al., 1997, 2005; Webber et al., 2010; Yeom, Fleury, & Keller, 2008).

Glasgow & Blakely (2000) found a link between transportation arrangements and social integration. They suggest that facilitating social integration might have potential benefits in terms of better mental and physical health. Coughlin (2001) reports a study where older participants described a strong link between transport and independence, reporting feelings of dependency towards people who transport them. Banister & Bowling's (2004) study on older people and quality of life showed the relevance of transport, particularly in terms of getting access to local services and facilities, and in engaging in social activities.

In a similar vein, some studies suggest that poor transport use could be linked to a reduced health status, and the inability to use transport can lead to depression, limited out of home activities, increased social isolation, reduced self-esteem and contribute to a poorer quality of life (Marottoli et al., 2000; Ragland, Satariano, & MacLeod, 2005). According to HelpAge International (HelpAge International, 2002) this situation could be even worse in developing countries where research reports indicate that problems with transport create a real barrier to older peoples' access to basic social services and participation in local activities; certainly the impact on quality of life is not trivial since the lack of regular transport facilities prevents older people reaching essential services.

It is important to note that most of the literature has focused on private transport modes, mainly the private car, but some studies also associate public transport to quality of life among older people, especially those who have ceased driving, cannot drive or cannot afford a car. For example, Gabriel & Bowling (2004) report results from a national survey in the United Kingdom, where participants aged 65 and older stated that good public transport contributes to a better quality of life; conversely, 32% of the participants in that study stated that poor public transport has a negative impact on their quality of life.

However, each transport mode imposes challenges and difficulties for older people such as concerns relating to safety, cost or limited access (McCluskey, Thurtell, Clemson, & Kendig, 2011). Although travel by car has been reported as one of the favourite modes of transport for older people (McCluskey et al., 2011; Windle & Burholt, 2003), public transport, particularly the bus service, has been reported as one of the best alternatives to it, especially for people who have retired from driving or those who cannot afford a car (Glasgow & Blakely, 2000; Tyler, 2002; Windle & Burholt, 2003). In a study undertaken in Australia with 620 participants aged 75 and older, Dent et al. (1999) found that 52% of participants stated that it was impossible to access private transport due to not having a car or not being able to drive.

The benefits in using public transport services can only be maximised if the transport is safe, accessible, and usable by the older population. Nevertheless, this mode of transport still presents a number of problems in its use by older people (Broome, McKenna, Fleming, & Worrall, 2009). Data from a modes of transport demand survey carried out in Guadalajara, Mexico (SEDEUR, 2009) suggested that for people aged 65 and over the use of taxis was about three times higher than the use of public transport, which might be explained by the fact that public transport presents several barriers to use by this age group.

Given the importance of mobility and public transport for older people's quality of life, it is of paramount importance to identify those characteristics of transport that could prevent or impose usability problems to this population group. To do so, it is important to analyse current research regarding barriers in using the bus service as well as defining what makes a good public transport service. Both of these aspects are presented below.

2.2.2 Problems and barriers in using the bus service

There are different sorts of barriers to the use of public transport which Tyler (2002) classifies as physical, sensory, cognitive, social, psychological, and economic. In a literature review paper Broome et al. (2009) propose barriers relating to kind of environment involved in the activity throughout the travel chain. These relate to the Physical environment (e.g. printed information, sidewalks, pedestrian crossings, bus stops, as well as buses); Institutional environment (bus service itself); Social environment (e.g. support of family, friends, other users or services providers); and Cultural environment (e.g. attitudes of services providers and other users). In a recent study of the bus service, Nickpour et al. (2012) used a classification based on physical, psychosocial and operational factors.

Several studies have been applied using different methods to identify barriers in the use the bus service by older people. There are three main methodologies used in the literature to explore those issues that either prevent or increase the difficulties in public transport use by older passengers: focus groups, interviews and surveys.

Notwithstanding, there are few studies where a mixed methodology including other techniques such as observation have been used. This section presents those studies organised according to the method used to identify barriers or problems in the use of the service. This section also provides information on the country or city where the studies were undertaken.

2.2.2.1 Focus groups studies

Rogers et al. (1998) used a focus group analysis to assess constraints on daily living of 59 healthy and active adults aged between 65 to 88 years old who were living in Atlanta, United States. Many participants in this study, particularly non drivers, pointed out transport as one of the most relevant constraints on their activities. Even though crime was reported as a limiting factor in using the transport system, other concerns were reported with higher frequency such as getting on and off buses, using the stairs and escalators in and out of the subway stations, and knowing how to get around. These authors analysed the capabilities limitations of older people against the demands imposed on them when using the transport system. One conclusion of this paper is that approximately half of the issues raised in the focus group discussions can be improved through training, redesign or some combination of both; which, according to the authors,

represents a good opportunity for the science and practice of human factors to help older people in their daily activities.

Glasgow & Blakely (2000) undertook a focus group study with 27 older non-metropolitan residents from upstate New York, aiming to examine how these older people construct their transportation arrangements during different stages of the life course. However an objective was also to analyse issues that older people disliked about different transport options. Analysis was divided between old-young (65-74 years) and old-old participants (75 and over). Negative comments about public buses were expressed with respect to scheduling inconvenience (limited night, weekend, and holiday service and limited service during daytime hours); difficulties in access for older people with disabilities, and the existence of fixed routes limiting access. More negative comments came from the old-old participants.

Carlsson (2004) carried out a focus group study in Sweden, in which 20 older participants with functional limitations were asked to talk about the problems they experienced using buses in a travel chain perspective focusing on the physical environment. Different aspects of usability problems and physical barriers emerged from this study. The author presents an analysis of the participants' functional limitations and the reported barriers by each of them. The main barriers were related to a) entrances (e.g. steps, manual door opening and round stairs, among others); b) the public outdoor environment (e.g. long distance to bus stops, irregular walking surfaces, high kerbs, differences in levels, steep side gradient on pathways, gradients, combined pedestrian and cycle-way and steps, among many others); c) bus stops (e.g. no weather protection, no seats, low seats, seats without back, many buses stop in the same stop, lack of timetables and small text on timetables, among others); and d) buses (e.g. bus doors swing out, high steps, buses not kneeling, presence of steps into the bus and narrow spaces between the seats, among others). One limitation of the study was that it aimed to explore the usability problems and barriers related only to the physical environment. However, the paper reported some barriers that might be more related to service operation than to physical barriers e.g. that passengers only have a short time for boarding and alighting, and that all seats are occupied by other people.

An extensive study was undertaken by the World Health Organization (2007) in 33 cities that belonged to both developed and developing countries. A total of 158 focus

groups, involving 1485 participants (older people and caregivers), were organized. Older people were the main source of information, but caregivers, service providers and voluntary and commercial sectors also contributed. The aim of the study was to find some answers for the following questions: What are the age-friendly features of the city they live in? What problems do they encounter? What is missing from the city that would enhance their health, participation and security? Eight topics were explored, and three of them related to bus service provision: outdoor spaces and buildings, transport, and respect and social inclusion. Relevant results from this study are shown in Table 2.1.

Table 2.1 Relevant results from World Health Organisation's study (WHO, 2007).

Area	Issue	Problem
Outdoor spaces and buildings	Pavements	Pavements that are narrow, uneven, cracked, have high curbs, are congested or have obstructions present potential hazards and affect the ability of older people to walk around.
	Pedestrian crossings	The ability to cross the road safely is a mentioned concern. In quite a few cities, it is reported that the pedestrian crossing lights change too quickly. Another common concern is that drivers fail to follow traffic signals and do not give way to pedestrians.
	Accessibility	In both developed and developing countries, people think that their city was not designed for older people. In many cities, reference is made to barriers to physical access, which can discourage older people from leaving their homes.
Transport	Affordability	Cost is viewed as a significant factor affecting older people's use of public transport.
	Reliability and frequency	There are a number of reports from cities at varying stages of development that public transport services are not frequent or reliable enough.
	Travel destinations	Concerns are expressed in both developed and developing countries about the adequacy of public transport routes; people complain that several areas of the city are not covered, or it is difficult to cross the entire city, or there are poor connections between buses and other means of transport.
	Vehicles design	Boarding and disembarking from vehicles is another major issue raised. People commonly observe that the design of public transport vehicles presents barriers to older people. In some cities, older people express concern about the deteriorated condition of some buses.
	Priority seating and passenger courtesy	In some cities passengers do respect the priority seating for older people, but this courtesy is not common in many cities.
	Drivers	In some cities courteous drivers are described as a

		<p>facilitator to use the bus service. In many others, however, concern is expressed about the insensitivity of drivers, particularly bus drivers, towards older people.</p> <p>One of the major concerns raised is that drivers do not wait for older people to be seated before starting off.</p> <p>It is pointed out that many middle class older people take a taxi or the metro rather than ride in a bus, because they are afraid of falling in a bus.</p> <p>A particular problem identified in developing cities is drivers' reluctance to pick up older people.</p> <p>Older people highlight the difficulties caused when bus drivers do not stop close enough to the curb to enable them to get on and off the bus safely. People mention that bus drivers stop at unmarked locations, which is often dangerous, particularly at road corners.</p> <p>Other identified barriers include careless driving and disregard for the rules of the road.</p>
	Safety and comfort	<p>There are concerns about safety. Only in some cities public transport is considered safe.</p> <p>In many cities, crowded buses, particularly during peak times (the "rush hour"), also presents safety issues for older people. This problem is more commonly identified in developing cities.</p>
	Bus stops	<p>The lack of shelter at transport stops is perceived as a disadvantage, as is the lack of seating at transport stops.</p> <p>The location of stops also presents some difficulties for older people. Problems are encountered in some cities when there are few bus stops and the distance between the stops is too great.</p>
	Information	<p>In a few cities, there is mention of the importance of having information on transport options, on how to use transport services, and on timetables.</p>
Respect and social inclusion	Respectful and disrespectful behaviour	<p>Participants in several cities also report disrespectful behaviour towards older people. People are seen to be impatient with older people who are slower doing things.</p> <p>Some young people are said to lack good manners, not to give up their seats on buses and to be verbally or physically aggressive towards older people.</p>

Broome et al. (2010) report a study using nominal group technique, which has some differences in relation to focus groups, but still maintains characteristics of a group interview. The aim of this study was to determinate whether older people reported and prioritised different barriers and facilitators to bus use than younger people and was based on a comparison between 231 older and 70 younger participants. Results indicate that older and young participants shared barriers and enablers in different areas, but also

some differences were noted. Older and younger set different priorities for barriers and facilitators, but also they differed on the way to describe or perceive them. Differences relating to the description and prioritisation of barriers from the older and younger participants in this study are shown in Table 2.2.

Table 2.2 Top 10 most highly prioritised barriers to bus use in older people and younger groups (Broome et al., 2010).

No	Older Adults	Younger adults
	Barrier	Barrier
	Percentage of votes (%)	Percentage of votes (%)
1	Unsuitable timetables and scheduling Busses too infrequent. Run at unsuitable times including limited night, early morning, weekends and holiday services.	Unsuitable timetables and scheduling Buses too infrequent. Lack of night, weekends and public holiday services
2	Inappropriate bus stop locations Bus stops not located near home, long distances between bus stop and destination, bus stops located too far apart	Punctuality of buses is poor Buses not running on time and unreliable
3	Difficulty with entry and exit Getting on and off the bus difficult due to steps at entry or driver not parking close to kerb	Inappropriate bus route Lack of direct bus routes causing long journey time. Few services available to neighbouring suburbs
4	Inappropriate bus route Bus did not travel to desired destinations including shopping centres, hospitals, nursing home and city centre. Lack of direct routes caused increased travel time	Lack of connections Poor co-ordination with trains buses and ferries. Lack of connecting services between neighbouring suburbs and to the city
5	Lack of connections Lack of co-ordination with other bus, train and ferry services, long waiting time between connecting buses and needing to change buses	Inconvenience Car and other modes of transport considered more convenient than buses
6	Driver not friendly or helpful Driver unfriendly, unhelpful, did not provide information, neglected to collect passengers at the stop, drove away before passengers were seated	No service A lack of services in some suburbs
7	Lack of bus shelters Lack of bus shelters to provide shade, seating and weather protection	Lack of prior knowledge Lack of knowledge of routes, services, timetables and bus stop locations
8	Inconvenience Driving a car more convenient than buses	Inappropriate bus stop locations Bus stops located at inconvenient places and too far from home or work
9	Lack of prior knowledge Lack of knowledge of how to use the bus, bus stop locations, where to access information and timetables, services available including connections	Lack of bus shelter Lack of bus shelters to provide weather protection
10	No service in the area No bus service to home, suburb or town	Signage unclear Difficult to read numbers on bus

2.2.2.2 Studies using interviews

Peel, Westmoreland, & Steinberg (2002) conducted a study in Australia, in which 30 older participants aged 75 and over were interviewed in depth concerning demographics, licence status, travel options available and used, and travel characteristics. As part of the results, some barriers to using public transport were identified. Barriers were related to a) the transport design regarding the height of the steps and the distance from the kerb; and b) transport services regarding a lack or reduction of services, unsuitability of route and timetables, distances from stops and location, inconvenience and length of time taken, and speed when pulling away from the bus stops; and c) personal health factors since a number of participants reported being unable to access public transport because of medical conditions affecting their mobility. Some participants in this study reported that fear of falling, “nerves”, and inability to manage on their own also impacted their confidence to use public transport.

Davey (2006) used face-to-face semi-structured interviews in New Zealand to identify the experiences, opinions and transport needs of 71 older people coping without a car. Results showed that if older people can walk with ease and use public transport, this may compensate for a lack of a car, but only as long as bus services are available and accessible. Nevertheless, none of the participants used the bus service as their main mode of transport. The main constraints to using public transport were availability and problems boarding and alighting from buses.

A total of 68 in-depth qualitative interviews were carried out for a study commissioned by the Department for Transport (2007) in the UK, aimed at understanding more about the transport needs of particular groups in the population. The report offered a summary of barriers in the use of the bus service, divided into a) psychological/emotional (fear of crime), and b) practical and functional (concerns about health and poor weather, limited routes and restrictive timetables, unreliable service, and difficulties carrying shopping). In conclusion the report suggests a number of implications for policy regarding the provision of transport to people; among them there is a call to minimise the impact of declining health on the use of public transport, and it is said that more can be done to reduce the barriers through improving training for bus drivers and applying some changes to the design of buses.

2.2.2.3 Survey studies

Ipingbemi (2010) carried out a study in Ibadan, Nigeria, in which a total of 264 older people participated in a questionnaire survey. The aim of the study was to investigate the travel characteristics and mobility constraints of the elderly in that city. The results suggest that some problems related to a) access and waiting time at the bus stop (few designated bus stops and the presence of informal bus stops, no seats or shelter, and long waiting time); b) Long access time (long time and distances to access to the bus stop); c) Design of commercial vehicles (difficulty to board and alight due to height of steps; and d) age-related abuse when using public transport (insult from commercial drivers and conductors).

2.2.2.4 Mixed methodology and/or observation studies

Coughlin (2001) reports a study in the Boston Metropolitan Area in which 45 people aged 75 and older participated in 3 focus groups and 17 in-person interviews. The objective of this study was to discern the perceptions and preferences of those participants about their transport options. Regarding public transport, participants stated concerns about going out at night and using the service, security and accessibility, problems getting on and off, and problems derived from rapid acceleration. In general, participants agreed that public transport has negative attributes, including waiting time and the inconvenient and limited scheduling of buses. Conversely, affordability and friendly drivers were pointed out as an attractive attribute of the service.

Broome, Worrall, McKenna, & Boldy (2010) conducted a study in Australia in which a combination of two methodologies was used. 227 people aged 60 and older took part in a nominal group technique and 40 people participated in a focussed ethnography. The authors highlight that these methods are better than traditional focus group or interview methods that have been commonly used in previous studies. Both of these methods aimed to identify barriers and enablers to using the bus service, as well as rank their importance. Factors identified as barriers using the nominal group technique were analysed within different spheres including: a) service design (inappropriate timetabling and scheduling, long distances to the bus stops, inappropriate routes, poor connections, expensive and difficult to understand ticketing, or having no service in the area); b) service provision (lack of punctuality, poor reliability, unexpected or unadvertised changes in the bus service, and difficult payment requirements; c) built environment (no or inappropriate pedestrian crossings, absent or poorly designed bus stops and shelters,

absent or obstructed footpaths, no parking available near to the bus stop, and poor visibility of oncoming buses); d) vehicle design (steps or obstructions at the entry or exit, poor signage of the bus number and route on the bus, mobility device inaccessibility, lack of air conditioning, poorly accessible buttons to request the bus to stop, lack of handles or grab rails, uncomfortable seats, and an inappropriate bus size; e) information provision (poor availability of and difficulty understanding printed timetables, telephone, internet, bus stop and on board information, and a poor promotion of the service); f) other people (rude and unhelpful bus drivers, crowded buses, and inconsiderate bus passengers. Poor behaviours specifically associated with the bus drivers were: poor communication, driving off before passengers are seated and not pulling close enough to the kerb); and g) older people (a lack of previous knowledge, difficulty handling luggage, restrictions in time and concerns for their personal safety. Overall, the authors did not find more barriers using the focussed ethnography, rather that they identified some enablers that participants had not mentioned in the group discussions.

Prioritization of the ten most-frequent barriers and facilitators to bus use from the nominal group technique and focussed ethnography data are shown in Table 2.3 and Table 2.4 respectively. The numbers in Table 2.3 denote the amount of votes given by the participants to each barrier and facilitator, whereas in Table 2.4 the numbers represent the total number of instances that the barrier or facilitator appears during the study.

Table 2.3 Top 10 barriers and facilitator to bus use reported by older people in the nominal group technique data (Broome, Worrall, et al., 2010).

Rank	Barriers	Votes	Facilitators	Votes
1	Limited scheduling of buses	207	Bus driver friendly and helpful	185
2	Long distance to the bus stop	141	Frequent and appropriate scheduling of buses	136
3	Poorly accessible entry and exit	114	Easy to get to bus stop	125
4	Inappropriate bus route	110	Accessible entry and exit	96
5	Poor connections	104	Good connections	77
6	Bus driver unfriendly and unhelpful	74	Appropriate bus route	61
7	Inadequate or no bus shelter	62	Affordable and easy to use ticketing	58
8	Inconvenience	57	Appropriate bus size	47
9	Lack of prior knowledge	51	Prior knowledge	40
10	No service in the area	48	Appropriate bus shelter available; Information easy to understand	37 37

Table 2.4 Ten most-frequent barriers and facilitator to bus use from focussed ethnography data (Broome, Worrall, et al., 2010).

Rank	Barriers	Instances	Facilitators	Instances
1	Poorly accessible entry and exit	59	Accessible entry and exit	203
2	No footpath or footpath obstructed/poorly maintained	46	Bus driver friendly and helpful	192
3	Bus driver unfriendly and unhelpful	31	Footpath available and unobstructed	103
4	No or inappropriate pedestrian crossing	31	Handles and rails available on the bus	95
5	Long distance to the bus stop	28	Prior knowledge	78
6	Poor weather	22	Appropriate bus shelter available	68
7	Inadequate or no bus shelter	21	Pedestrian crossing available and appropriate	53
8	Poor usability of information	15	Frequent and appropriate scheduling of buses	52
9	No or inadequate signage on the bus	15	Wide aisle on the bus	45
10	Uncomfortable or inaccessible seats on the bus	2	Comfortable and accessible seats on the bus	44

Nickpour et al. (2012) conducted a study in London using a combined primary and secondary methodology with a diverse range of methods. Unlike previous studies that focussed on different characteristics of the environment, this study aimed to assess the bus service through a holistic and comprehensive service-oriented approach. The main focus of the project was on people with mobility challenges, but many other stakeholders were included in the consultation. Three focus groups were held with representatives of services providers, users with mobility challenges and with service non-users including seven people with mobility challenges. Two sets of access audit were undertaken which included direct observation from members of the research team and some participants in the study. A number of interviews were carried out with individuals from groups and organisations related with the service; and, a literature review from a number of governmental and non-governmental organisations related to transport and vulnerable users was also part of the study. Results from this study are presented as problematic issues regarding three categories: a) physical, where the most problematic issue was getting from home to the bus stop and from the bus stop to their final destination; among the identified barriers were narrow pavements, loose paving stones, steep roads, difficult crossings, positioning of litter bins in the bus stops; b) psychological, in which problematic issues were related to uncertainties (e.g. whether or not they were able to get on the bus), overcrowding, negative experiences with drivers (e.g. inconsiderate driving or the perception of an unfriendly or surly attitude

towards the user), negative behaviour of other passengers (e.g. teenagers who are very loud and use foul language, people who have loud conversations on mobile phones, passengers pushing and shoving other passengers or not waiting in the queue), and off-putting stories (e.g. participants had heard bad experiences from friends and relatives); and c) operational, where the authors identified a problem regarding the reliability of the service. Reliability is the basis on which the bus companies are judged and therefore bus drivers are under pressure to run on time. This situation sometimes makes them feel unenthusiastic about picking up mobility challenged passengers. The authors discuss the importance of the psychological issues as a source for not enjoying a bus journey or for not using the service at all.

2.2.3 Criteria for a good (an inclusive) bus service

Based on the idea that a good bus service is one that is inclusive, it is worth defining what an inclusive service is. Accordingly, the British Standard on Inclusive Service Provision defines an inclusive service as the ‘availability, usability and accessibility of a service to all consumers equally, regardless of their personal circumstances’ (BS 18477, 2010:4). Beyond the definition the Standard also establishes principles for guaranteeing the delivery of this kind of service. Among these principles is one related to the level of awareness that all managers and relevant staff should have of ‘how they should treat consumers and whether improvements are required to ensure delivery of inclusive services, particularly to consumers at greater risk of vulnerability’. This Standard also highlights that the concept of usability is very important in delivering inclusive services.

The document *Global Age-friendly Cities: A Guide* developed (along with the study described in Section 2.2.2.1) by the World Health Organization (2007) provides a set of guidelines to reduce or eliminate the social and physical barriers that prevent or impose difficulties to the participation of older people in society. The document provides age-friendly guidelines for a variety of social aspects, environments and services, including public transport. Relevant age-friendly guidelines for addressing the bus system are shown in Table 2.5.

Table 2.5 Age-friendly guidelines for bus services (WHO, 2007).

1. Availability	<ul style="list-style-type: none"> Public transport services are said to be available in almost all of the cities, although not in all areas
2. Affordability	<ul style="list-style-type: none"> Public transportation is affordable to all older people. Consistent and well-displayed transportation rates are charged.
3. Reliability and frequency	<ul style="list-style-type: none"> Public transport is reliable and frequent (including services at night and at weekends).
4. Travel destinations	<ul style="list-style-type: none"> Public transport is available for older people to reach key destinations such as hospitals, health centres, public parks, shopping centres, banks and seniors' centres. All areas are well-serviced with adequate, well-connected transport routes within the city (including the outer areas) and between neighbouring cities. Transport routes are well-connected between the various transport options.
5. Age-friendly vehicles	<ul style="list-style-type: none"> Vehicles are accessible, with floors that lower, low steps, and wide and high seats. Vehicles are clean and well-maintained. Vehicles have clear signage indicating the vehicle number and destination.
6. Priority seating	<ul style="list-style-type: none"> Priority seating for older people is provided, and is respected by other passengers.
7. Transport drivers	<ul style="list-style-type: none"> Drivers are courteous, obey traffic rules, stop at designated transport stops, and wait for passengers to be seated before driving off, and park alongside the curb so that it is easier for older people to step off the vehicle.
8. Safety and comfort	<ul style="list-style-type: none"> Public transport is safe from crime and is not overcrowded.
9. Transport stops and stations	<ul style="list-style-type: none"> Designated transport stops are located in close proximity to where older people live, are provided with seating and with shelter from the weather, are clean and safe, and are adequately lit. Stations are accessible, with ramps, escalators, elevators, appropriate platforms, public toilets, and legible and well-placed signage. Transport stops and stations are easy to access and are located conveniently. Station staff is courteous and helpful.
10. Information	<ul style="list-style-type: none"> Information is provided to older people on how to use public transport and about the range of transport options available. Timetables are legible and easy to access. Timetables clearly indicate the routes of buses accessible to disabled people.
11. Pavements	<ul style="list-style-type: none"> Pavements are well-maintained, smooth, level, non-slip and wide enough to accommodate wheelchairs with low curbs that taper off to the road. Pavements are clear of any obstructions (e.g. street vendors, parked cars, trees, dog droppings, snow) and pedestrians have priority of use.
12. Roads	<ul style="list-style-type: none"> Roads have adequate non-slip, regularly spaced pedestrian crossings ensuring that it is safe for pedestrians to cross the road. Roads have well-designed and appropriately placed physical structures, such as traffic islands, overpasses or underpasses, to assist pedestrians to cross busy roads. Pedestrian crossing lights allow sufficient time for older people to

	cross the road and have visual and audio signals.
13. Respectful and inclusive services	<ul style="list-style-type: none"> • Older people are consulted by public, voluntary and commercial services on ways to serve them better. • Public and commercial services provide services and products adapted to older people's needs and preferences. • Services have helpful and courteous staff trained to respond to older people.

In turn, the UK's Department for Transport (2012) developed a guide of transport solutions for older people. The document contains information and good practice examples about schemes and resources to help in the planning of transport systems by considering older peoples' needs. This guide is based on research that identifies transport barriers that older people face when undertaking journeys, both on foot and by public transport; solutions and good practices are suggested around the following issues in Table 2.6:

Table 2.6 Transport solutions for older people (Department for Transport, 2012).

Affordability,	<ul style="list-style-type: none"> • Solutions include cost reductions for older passengers. The best practice is the free off-peak concessionary bus travel throughout England, which allows free local bus travel for eligible older and disabled people, from 9.30am until 11pm on weekdays, and all day at weekends and bank holidays;
Availability	<ul style="list-style-type: none"> • Transport solutions and spatial planning should be closely integrated and consider the location of key destination as places of work, healthcare facilities, education, food shops and leisure facilities. For this case, solutions are beyond of bus services.
Accessibility	<ul style="list-style-type: none"> • Solutions should cover all aspects and features of the end to end journey. It is understood that any obstacle or barrier on a journey could demoralize an older person's disposition to travel. Many good practices are available, for instance accessible buses, pedestrian crossings or accessible pedestrian environments.
Acceptability	<ul style="list-style-type: none"> • Solutions should be focused to increase person's ability and willingness to use transport. Actions try to improve staff attitudes, reduce concerns for personal security and safety, and improve information on how to use the transport system.

The criteria provided by the British Standard on Inclusive Service Provision (BS 18477, 2010), the 'age-friendly' guidelines (WHO, 2007) and the guide for transport solutions (Department for Transport, 2012) appear to be consistent in suggesting that a good service should be affordable, available, usable, accessible, safe and comfortable. Therefore, all these documents suggest similar actions that should be taken to provide a bus service for older people.

The criteria included in the standard and guidelines related to service provision for older people are in line with research results that have investigated problems that older people face in using the service. For example, the concepts of accessibility and usability have been used to explore problems that older people face using public transport (Broome et al., 2009; Carlsson, 2004). Passenger comfort has been previously studied from an ergonomic perspective (e.g. see Jianghong & Long, 1994; Kogi, 1979; Osborne, 1978), and it has been pointed out as is one of the attributes that passengers expect to find in a good bus service (Balcombe et al., 2004; Molinero & Sanchez, 2005; Redman, Friman, Gärling, & Hartig, 2013). Similarly, safety is one of the expected attributes in a good public transport service (Balcombe et al., 2004; Molinero & Sanchez, 2005; Redman et al., 2013). At this point, the relevance of the terms safety, comfort, accessibility and usability in designing an inclusive bus service is evident. Therefore, it results necessary to include their definition or provide an explanation of them.

Usability is a term used in the Ergonomics field that is defined as the ‘extent to which a product can be used by specified individuals to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use’ (ISO 9241-11, 1998), where ‘effectiveness is the accuracy and completeness with which users achieve specified goals’; efficiency ‘is the amount of resources expended in relation to the accuracy and completeness with which users achieve goals; and satisfaction ‘is the freedom from discomfort, and positive attitudes to the use of the product’. It should be noticed that this concept also implicitly defines what comfort is. Comfort is another of the requirements for a good bus service (Balcombe et al., 2004).

The term accessibility initially referred to the relationship between the person's capabilities and the demands made by the design of the physical environment. Accessibility referred to compliance with official norms or standards in objective terms (Iwarsson & Ståhl, 2003). However, nowadays it is a usability-orientated term, which is defined as the ‘usability of a product, service, environment or facility by people with the widest range of capabilities’ (BS 18477, 2010).

In turn, safety is defined as ‘freedom from risk which is not tolerable’: where risk is the ‘combination of the probability of occurrence of harm and the severity of that harm’; and tolerable risk is considered as the ‘level of risk that is accepted in a given context based on the current values of society’ (ISO/IEC Guide 51:2014, 2014). The area of

safety is concerned with the predictable or accidental consequences of using a product, e.g. health risks; and safety requirements apply to the intended user group of the product (Wegge & Zimmermann, 2007).

2.2.4 Summary of contribution to thesis

The literature in Section 2.2.1 highlights the relevance of enabling people to achieve active ageing. Mobility and transport services have been pointed out as key factors to do so, as well as enhancing the quality of life of older people. It also emphasizes the importance of public transport, particularly the bus service for this group of people. Section 2.2.2 has provided the theoretical and methodological background in researching the problems that older people face in using the bus service. For this research, which takes a Human Factors perspective, aspects of particular relevance are the idea that the behaviour of users can be investigated in terms of the demands imposed by the transport system and the capabilities of the individual and also that most of the issues can be improved through training, redesign or some combination of both (Rogers et al., 1998).

Section 2.2.3 provided guidelines of how bus services must be designed considering specific criteria as affordability, accessibility, usability, safety and comfort in order to make them more inclusive. The linkage between earlier research and the content of the guidelines suggests that lessons are being learnt i.e. research has identified what makes a poor transport service and based on that knowledge, guidelines have been developed. However, based on the analysis of the current literature, it may be concluded that presence of some gaps suggests that more research is needed. For instance:

- a) Most of the studies have been undertaken in developed countries and there appears little evidence of such research in developing countries. Even though the study of the World Health Organization (2007) included several cities from developing countries, there was a lack of explanation about how differences of development have an impact on service provision;
- b) Only one study was found which investigated whether the barriers in using the bus differed between younger and older people (Broome et al., 2010). This is an important point of distinction since it will help to determine whether there is a need for different interventions or whether an intervention for older people can be beneficial for other population groups;

- c) The majority of the studies have used methods such as focus groups, interviews or surveys. The use of mixed methodologies as well observational approaches are needed to complement or contrast findings and to incorporate the objective assessment of the gap between what users need and what service operators provide.
- d) Although the research has identified a range of barriers, there is a lack of studies with a focus on priorities for interventions. The study Broome, Worrall, et al. (2010) suggested some priorities, however more research is needed since priorities might be related to specific contexts.
- e) Another limitation identified within the literature is that although some studies have investigated different environments involved in the travel chain, only one study is reported as using an holistic approach (Nickpour et al., 2012). A service approach might better help to understand bus usage within the context of a system and the level of service it provides to its users, as well as improve the understanding of the needs of people providing the service, e.g. bus drivers.

2.3 Design for Services

One of the conclusions from the previous Section 2.2 highlighted the relevance of investigating bus usage using a holistic approach. For this reason Service Design as an approach was considered to be of potential significance to this research and was therefore included within the literature review. Without any intent to be exhaustive, this section introduces some ideas related to the concept of service provision, and provides a brief synthesis on what characterises a service. Subsequently, Sections 2.3.1 to 2.3.5 cover some key features of Service Design which are relevant for understanding the contribution of this design approach to this research.

There is not a single definition for service or services, however Edvardsson et al. (2005) found that most of the researchers stress the process nature of services. They also found that service definitions often include concepts such as activities, deeds, processes, performance, interactions, experiences, and solutions to customer problems.

On the other hand, the literature on services has also focused on the service characteristics, which are frequently compared against the characteristics of products. Services are thus characterised by their intangibility, inseparability, heterogeneity, and

perishability (Zeithaml, Parasuraman, & Berry, 1985) (see Table 2.7 for a description of these characteristics). Although, the use of these characteristics to describe a service has been criticised because they are neither based on empirical research, nor developed from previous research and theories, (Edvardsson et al., 2005), they have been accepted and used for discussing the service nature (Meroni & Sangiorgi, 2011). The following sections describe how Service Design contributes in the design of services.

Table 2.7 The main service characteristics (Zeithaml et al., 1985)

Service characteristics	Descriptions
Intangibility	‘Because service are performances, rather than objects, they cannot be seen, felt, tasted, or touched in the same manner in which goods can be sensed’
Inseparability (of production and consumption)	‘Whereas goods are first produced, then sold and consumed, services are first sold, and then produced and consumed simultaneously’ It ‘forces the buyer into intimate contact with the production process’.
Heterogeneity (or non-standardization)	It ‘concerns the potential for high variability in the performance of services. The quality and essence of a service can vary from producer to producer, from customer to customer, and from day to day’.
Perishability	It ‘means that services cannot be saved’. ‘Because services are performances that cannot be stored, service businesses frequently find it difficult to synchronize supply and demand’.

2.3.1 Service Design

A basic philosophy underlying this thesis is that of Service Design, in as much as there is a focus on design from a holistic service perspective. This is important since the literature indicates that barriers to bus use for older people extend beyond just physical interaction with the vehicle and, similarly, that potential solutions might lie outside of vehicle design e.g. driver training. A service design perspective will therefore enable a broader view of the user within the bus system. Service Design aims to innovate or improve services that are useful, usable and desirable from the user perspective, and efficient, effective and different from the organisations perspective (Mager & Sung, 2011; Moritz, 2005). Accordingly, it suggests that Service Design provides several benefits to the end user experience when applied to services sectors as retail, banking, transportation, and healthcare (Stickdorn, 2010b). But it has also been defined as a

strategic approach that helps service providers to get a better position of their service offerings (Mager & Sung, 2011). In the public services arena, it has been pointed out as an approach that is less about competition and contestability and more about reducing the gap between what organisations do and what users expect or need (Parker & Heapy, 2006). This recognition of the importance of the user suggests that Service Design relates well to the Human Factors approach underpinning this research.

Stickdorn & Schneider (2010) call attention to the notion that Service Design refers more to the process of designing rather than its outcome since they state that ‘the outcome of a service design process can have various forms: rather abstract organisational structures, operation processes, service experiences and even physical objects’ (Stickdorn & Schneider, 2010:14).

2.3.2 Principles of Service Design

Stickdorn (2010) has defined five basic principles that can be used as a philosophical framework for working in Service Design. These principles are described in Table 2.8 and discussed in the next paragraphs. They are used as guiding principles throughout this thesis.

Table 2.8 Five Principles of Service Design Thinking (Stickdorn, 2010b)

Principle	Description
1. User-centred	Services should be experienced through the customer’s eyes.
2. Co-creative	All stakeholders should be included in the service design process
3. Sequencing	The service should be visualised as sequence of interrelated actions
4. Evidencing	Intangible services should be visualised in terms of physical artefacts
5. Holistic	The entire environment of a service should be considered

The first principle is user-centred. Stickdorn (2010) points out that to deliver a service, some customer participation is necessary. Meroni & Sangiorgi (2011) highlight that Service Design, since its origins, has considered the users as its main focus in the process of service delivery. They claim that this approach generally conceives users as a resource rather than a burden or a problem. Nevertheless, beyond being a user-centred approach, Service Design is considered as a human-centred approach that investigates

or understands peoples' experiences (as users, service staff, communities or humanity in a wider sense), interactions and practices as a main source of inspiration for redesigning or improving services (Meroni & Sangiorgi, 2011; Polaine et al., 2013).

The co-creative principle demands user and other stakeholder e.g. frontline staff, office personnel or directors participation in the service design process (Stickdorn, 2010b). This principle is related to the service characteristic of 'inseparability' (as described in Table 2.7). According to Mager & Sung (2011) co-creation is one of the driving forces to integrate the expertise of those that are in the heart of the service experience and mobilizing energies for change. As Polaine et al. (2013:36) note, 'it is essential to understand that services are, at the very least, relationships between providers and customers, and more generally, that they are highly complicated networks of relationships between people inside and outside the service organization'.

The principle of sequencing suggests that services should be visualised as a sequence of interrelated actions between users and the service over a period of time (Stickdorn, 2010b). These interrelated actions have been mentioned in the literature in different ways, such as: service interface, service encounters, touch-points and moments of truth (Sangiorgi, 2009). In this research the terms touch-point or touch-points are used to refer these points of interaction between users and service. As services are delivered and consumed over time, Service Design observes the full customer journey, containing user's experience before and after the service encounters (Mager & Sung, 2011). Parker & Heapy (2006) point out that services need to be understood as a journey or a cycle – a series of critical encounters that take place over time and across channels. These service encounters or touch-points can take place in human to human interactions (e.g. bus passenger to bus drivers) or human to physical artefacts interactions (e.g. bus passenger to bus features) across the whole service. Therefore, from this perspective, elements such as: previous experience, making the decision to use the service, walking to the stop and waiting for the bus, boarding the bus, finding a seat, traveling, alighting from the bus, and walking to destination, all contribute to the experience of bus service use.

The fourth principle is evidencing, which refers to the notion that services should be visualised in terms of physical artefacts. Since services have a quality of 'intangibility' (Shostack, 1982; Zeithaml, Parasuraman, & Berry, 1985) it is important to transform them into perceivable aspects of physical evidence along the touch-points of the

service experience (Mager, 2009; Meroni & Sangiorgi, 2011; Polaine et al., 2013). Service Design employs tools which help to visualise the: services processes, points of customer contact, and to communicate the user experience (Segelström & Holmlid, 2009). Section 2.3.4 covers the use of visualisations in Service Design.

The fifth principle suggests that Service Design is holistic, and therefore the entire environment of a service should be considered. As Stickdorn (2010:44) notes ‘working in a holistic way is an illusion, it is simply impossible to consider every single aspect of a service. However, the intention should always be to see the wider context in which a service process takes place’. In turn, Polaine et al. (2013) state in relation to the relevance of using a holistic view: ‘No matter how well we did our job, if another link in the chain was broken, the entire thing was broken from the customer’s perspective’.

2.3.3 Service Design Process

This short section presents the basics of the process followed in Service Design. The intention of including this section is to discuss its similarities with the Inclusive Design process followed in this thesis (Inclusive Design Waterfall Model in Section 1.6). In addition, Sections 2.3.4 and 2.3.5 will refer back to this design process. A common design process used in Service Design is the ‘Double Diamond’ model developed by the Design Council (n.d.). This model is divided in four sequential stages (see Figure 2.2): discover, define, develop and deliver. The double diamond shows how the design process goes from moments where possibilities are broad to situations where they are narrow and focused on specific objectives (Define and Deliver). The stages of the process are defined as:

- Discover: ‘The start of a project is a period of discovery, gathering inspiration and insights, identifying user needs and developing initial ideas’
- Define: this phase ‘represents the definition phase, in which designers try to make sense of all the possibilities identified in the Discover phase’
- Develop: it ‘marks a period of development where solutions are created, prototyped, tested and iterated. This process of trial and error helps designers to improve and refine their ideas’
- Deliver: it is the phase ‘where the resulting product or service is finalised and launched. The key activities and objectives during this stage are: final testing, approval and launch, targets, evaluation and feedback loops’.

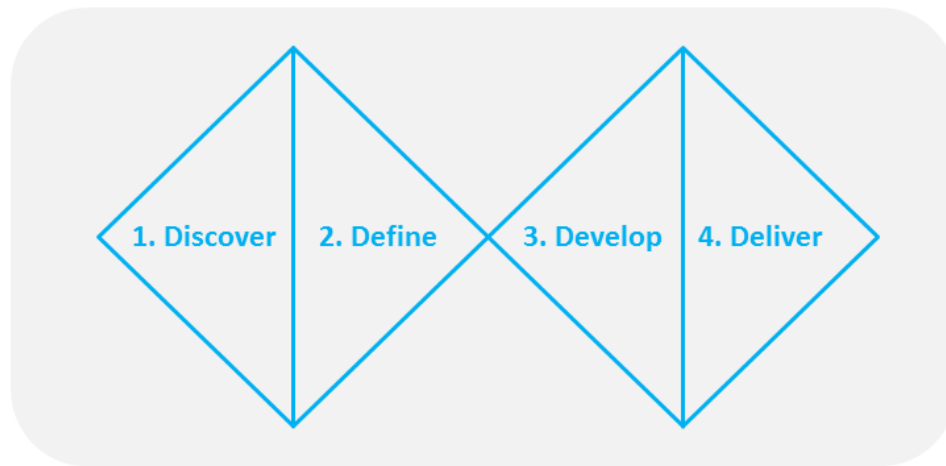


Figure 2.2 The Double Diamond design model (Design Council, n.d.)

Although the Double Diamond design model and the Inclusive Design Waterfall model (outlined in Section 1.6) have particular characteristics, in essence both present several similarities. For instance, both models start with a Discover stage in which they both seek to gain understanding of user needs and expectations. The stage Translate (Waterfall model) might lie between the Discover and Define stages of this model whilst the stages Create and Develop (Waterfall model) fit with Develop and Deliver stages in the Double Diamond model in terms of the activities involved. These similarities can be also compared with the exploration, creation, evaluation model frequently referred to in the Inclusive Design Toolkit (Clarkson, Coleman, Hosking, & Waller, 2011).

2.3.4 Visualisations: Making the intangible tangible

At the beginning of Section 2.3 it was pointed out that services are characterised as intangible entities therefore one of the contributions from Service Design is to make the intangible tangible (Kimbell, 2009; Meroni & Sangiorgi, 2011). The first principle of service design stated that the requirements of all those involved in the service, users and other stakeholders, need to be identified. In addition, principle 5 states that there needs to be a holistic approach. This implies that a Service Design approach has the potential to amass a large amount of data which, in keeping with principle 2 concerning co-creation, will need to be conveyed to all participating groups. As discussed in principle 4, it is important to evidence such information by transforming it into physical entities – to make the intangible tangible and visible and to this end service designers use a series of tools and techniques to visualise the service process (Kimbell, 2011; Mager, 2009;

Polaine et al., 2013; Stickdorn & Schneider, 2010). This is one of the core practices in Service Design, and it can be claimed as one of its fundamentals (Segelström & Holmlid, 2009).

Segelström (2009) investigated the role of visualisations in Service Design through a study where 14 service designers were interviewed. The objective was to answer why and how service designers visualise their material. He found that motivations for visualisations were to help the service designers to articulate and communicate insights to their clients, and as a way to maintain empathy with users (Table 2.9 presents the arguments for using visualisations). The study also suggests that the designers used different tools at different points within the service design process. For instance, the service blueprint was helpful as a tool in understanding the context and current situation of a service as well identifying design opportunities, whereas future scenarios were useful as a tool in creating a new service. Visualisations were also found to be affected by those whom they were being communicated to since those which were directed towards external persons, were usually made simpler and more aesthetically appealing.

Table 2.9 List of arguments for using visualizations sorted in categories according to type of reasoning (by Segelström, 2009)

Articulate insights	Keep empathy	Communicate insights
Summarize data	Inspiration	Transfer feeling
Present general impression	Create empathy	Transfer insights
Framework for interpreting data	Remember users	Make data accessible
Find patterns	Tell an interesting story	Present insights
Translate data into usable insights	Humanize data	Present research
	Keep data alive	To use in workshops
	Vitalize stories	
	Capture raw data visually	
Depends on the goal		

As another objective from the study above, Segelström & Holmlid (2009) explored what service designers say about how and when visualisations are used in the user research phase ('Discover' according to the Double Diamond design model) of service design projects. They found that all of the interviewees reported using visualisation techniques as part of their work process, and that these techniques were used widely in

the research phase as a tool for translating raw data into insights and as a way to communicate these insights to the design team or to service stakeholders. They found that blueprints were used as abstract descriptions of the current state of the service.

2.3.5 Service Blueprinting: a technique for visualising and communicating the knowledge about the service

The above section has highlighted the relevance of visualisations for articulating and communicating to the stakeholders the current state of the service. Whilst there is a wide range of visualisation tools available, one of those most useful in depicting research about the service is Service blueprinting. Service blueprinting is a method introduced by Shostack (1982, 1984) and developed further by Kingman-Brundage (1989,1993,1995) to visualise service processes (Fließ & Kleinaltenkamp, 2004). As the Design Council (2013) define it: ‘A service blueprint is a detailed visual representation of the total service over time - showing the user’s journey, all the different touch-points and channels, as well as the behind the scenes parts of a service that make it work’.

Holdford & Kennedy (1999) state that service blueprints are pictures or maps of service processes that allow stakeholders involved in designing, providing, managing, and using the service to better understand them and deal with them objectively. According to Van Dijk, Raijmakers & Kelly (2011) service blueprints are a way to specify each individual aspect of a service, and they help to provide a clear road map for actual service delivery.

Fließ & Kleinaltenkamp (2004) described a service blueprint as a two-dimensional picture of a service process. The horizontal axis represents the actions conducted chronologically by the service customer and the service provider, and the vertical axis differentiates between different areas of action. Though blueprints are not homogeneously structured (Fließ & Kleinaltenkamp, 2004) and frequently change in terms of design and content depending on the project and its purpose (Polaine et al., 2013). Bitner, Ostrom, & Morgan (2008) indicate that a typical service blueprint comprises the following five components, which are illustrated here with a bus service example.

- 1) Customer actions, e.g. pay the fare
- 2) Onstage/visible contact employee actions, e.g. interaction with the driver
- 3) Backstage/invisible contact employee actions, e.g. further processing of money collected by driver
- 4) Support processes, e.g. accounting systems and
- 5) Physical evidence e.g. customer ticket

These areas of action are separated by 'lines', which are defined by Fließ & Kleinaltenkamp (2004) as follow:

- 'The "line of interaction"' separates the customer action area from the supplier action area, representing the direct interactions between customer and supplier. Above the "line of interaction," we find activities, choices and interactions performed by the customer. e.g. interaction with the driver
- The "line of visibility" differentiates between actions visible and invisible to the customer. Above the "line of visibility," actions and decisions carried out by front office employees are shown. e.g. what the passenger can see, e.g. driver and bus
- The "line of internal interaction" distinguishes between front office and back office activities. Support processes, which are necessary to provide front office employees in delivering the service, are carried out beneath the "line of internal interaction" e.g. what the passenger cannot see, accounting systems, how the driver is paid, bus suspension.

Figure 2.3 shows the components and structure of a typical service blueprint.

Physical Evidence	
Customer Actions	
Onstage/ Visible Contact Employee Actions	Line of Interaction
Backstage/ Invisible Contact Employee Actions	Line of Visibility
Support Processes	Line of Internal Interaction

Figure 2.3 Service Blueprinting Components (Bitner et al., 2008)

2.3.5.1 Advantages in using blueprinting for service improvement

A service blueprint is an extremely useful tool for service design (Polaine et al., 2013), because it is more precise than verbal definitions and less subject to misinterpretation (Shostack, 1984). Service blueprints are relatively simple and their graphical representations are easy for all stakeholders involved—customers, managers, and frontline employees—to assimilate, utilize, and even adapt to meet different necessities according to each service.

As stated by Bitner et al. (2008) service blueprinting helps to understand services as processes, and allows members of the organization to understand the customer's experience. It provides a common platform and point of discussion for all stakeholders to participate in the service development or service improvement. Furthermore, service blueprinting is applicable in understanding and designing ideal service experiences and can provide a means for service designers to contrast the customer's ideal service and the firm's actual existing service.

Service blueprinting can also be used as a method for generating ideas for a new service (blueprints for service innovation), or as a process of analysis for improving an existing service (blueprints for service improvement) (Polaine et al., 2013). According to Segelström, (2009) when improving a service, blueprints are useful to help understand the context as well as identifying design opportunities, while the future scenarios tool

fits better when creating an entirely new service. In line with this, Chuang, (2007) suggests that service blueprints facilitate problem solving and creative thinking by identifying potential points of failure and highlighting opportunities to enhance customers' perceptions of the service, whilst Polaine et al. (2013) state that a service blueprint 'tells you not only what is wrong, but also how to fix it'.

2.3.6 Summary of contribution to thesis

The literature within the section above provides knowledge as to how Service Design employs philosophical principles, methods and tools in designing useful, usable and desirable services. In so doing, it raises a number of relevant points in relation to the thesis as discussed below. With respect to the Principles of Service Design, it can be seen that these have the potential to provide strong guidance in designing the thesis to reach its aim.

Especial attention deserves to be given to the principle 'User-Human Centred', which powerfully focuses research on people's needs which, in the context of this work, will relate not only to the bus users, but to the bus drivers, and other stakeholders too. It is through this principle that the Service Design approach most closely aligns to the Human Factors underpinning to the thesis.

The principle of 'Co-creation' will be used to include several stakeholders, and analysing the behaviour of driver and passengers. 'Sequencing' guided the analysis of user interactions in a door-to-door journey. 'Holistic' will be helpful in analysing most of the components of the bus service, and in understanding the context from the stakeholders perspective. 'Evidencing' will be the principle guiding the development and assessment of an inclusive service blueprint. Therefore visualisations, particularly service blueprinting, is relevant to the inclusive service design approach proposed in this thesis.

A final important point of note is that although one of the core issues for Service Design is to put users in the centre of design activities, it appears to under-emphasise that users are diverse and possess a variety of capabilities, needs, and desires, which present specific challenges to the design of services. This potential gap in Service Design, in not explicitly encouraging service designers to consider the needs of a range of users, is

where Inclusive Design can be employed to contribute to the design of inclusive services (as discussed in Section 2.4).

2.4 Design for Inclusion

Initiatives for designing for inclusion have been driven by the increase in the older population (as discussed in the introduction); along with acknowledgement of the rights of disabled people through legislative imperatives such as the Americans with Disabilities Act (ADA, 1990) established in United States and the Disability Discrimination Act (DDA, 1995) in the United Kingdom in 1995 (now replaced by The Equality Act, 2010) (Coleman et al., 2003). In this context some design approaches emerged with the intention of providing benefits for more users, in particular disabled and/or older adults (Clarkson, Dong, & Keates, 2003). As Clarkson & Coleman (2013:1) argue ‘these developments have progressively shifted the focus from THEM – the elderly and disabled in academic parlance – to the US’. This section introduces some pertinent aspects of inclusive design. It begins by describing two disability models, followed by the concept of design exclusion. Key features of inclusive Design which are relevant for understanding the approach for this research are then discussed.

2.4.1 Disability Models

The ageing process is usually related to disability in some form since it is accepted that physical and psychological impairment becomes more likely as age increases (Smith, 1990). In fact, most research about health among the elderly has actually focused on trends in disability (Crimmins, 2004). According to the World Health Organization (2011) the relationship is straightforward: there is higher risk of disability at older ages. The data show that disability prevalence in the global population increases being less than 20% for those aged from 45 to 54 rising to more than 50% for people aged 75 and over. A higher rate of disability among older people is result of an accumulation of health risks across the lifespan of disease, injury, and chronic illness, but an older person may be disabled just by the natural ageing process reducing their capabilities. Furthermore, disability is a spectrum, in such case ‘All of us could be considered as disabled to some extent. . . . Deciding how far ability has to be impaired to constitute a disability is no easy matter’ (The Lancet, 1999).

In this context, it is relevant to try to understand what disability means. Most studies of disability define it as the lack of ability to live independently and take care of one’s

personal needs (Crimmins, 2004). However, disability is dynamic, multidimensional, and contested (WHO, 2011); and definitions depend on the focus of theoretical approaches. In this regard, it is possible to identify two models that attempt to define what disability is: The medical model and the social model. These models appeared in chronological order and mark the transition from an individual perspective to a structural perspective.

The medical model (1900s-1970) was developed by the majority, normally able community, and particularly by medical practitioners. In this model, responsibility for disability is placed with the individual, who is viewed as a patient and excluded from mainstream markets and services and controlled as to when and where he or she can shop, use public transport or access personal finances (Owen & Johnston, 2003). This model suffered from a lack of knowledge about the social dimensions of disability, particularly those where the person does not have control. This resulted in a very narrow point of view, in which all of the problems were seen as part of the person, who had to adapt to rest of society (Tyler, 2002).

In contrast, the social model (1970 to the present) was developed by and for differently able people. Disability is seen as being primarily caused by society, because of a failure to provide suitable products and amenities (Owen & Johnston, 2003). This model has the idea that disability is not inherently a part of the person, but rather a function of the interaction between the person and the environment. Therefore, disability is the result from the difference between the capabilities of the person and the demands of the environment, which has been designed considering only able-bodied people (Putnam, 2002). According with this approach, the individual may have a physical impairment, but this on its own does not constitute disability. The World Health Organization broadens the definition of disability beyond impairment to also include limitations in activities such as the inability to read or move around; and restrictions in participation, such as exclusion from school or work (WHO, 2012). People can be excluded from an activity by all kind of barriers, which could be physical, sensory, cognitive, social, psychological or economic. The consequences of such model are that much more attention must be paid to the design of all facilities in order that people are not excluded from them (Tyler, 2002).

The social model of disability is particularly useful for this research since it frames the research focus in the direction of understanding how the bus system fails the user. In this sense, the social model could be viewed as a theoretical support in understanding the difficulties of older passengers in using the bus service as well as providing guidance as to how to design better public transport systems. The social model is also of relevance to the thesis since it introduces the concept of ‘barriers’ which may be considered as touch-points which are problematic for the users and so in this way it integrates with the Service Design approach.

2.4.2 Inclusive Design

The basic philosophy underlying this thesis is that of inclusive design, in as much as needs to be a focus on the design of services from an inclusive perspective. ‘Inclusive Design is neither a new genre of design, nor a separate specialism. It is a general approach to designing in which designers ensure that their products and services address the needs of the widest possible audience, irrespective of age or ability’ (Design Council, 2008). In the British Standard (BS 7000-6, 2005:8) inclusive design is defined as ‘design of mainstream products and/or services that are accessible to, and usable by, people with the widest range of abilities within the widest range of situations without the need for special adaptation or design’. However, a key characteristic of inclusive design is to increase the target group of a product or service, but without compromising the business goals of profit and customer satisfaction (Coleman et al., 2003).

A classic example of applying these principles is the case of public transport in the UK. Over the past twenty years, the UK has seen the successful introduction of accessible buses which have low-floors or kneeling facilities and colour contrasting grabrails for those with visual impairments. Such bus design has enabled easier access to elderly, parents with young children, as well as to wheelchair users (Balcombe et al., 2004). The importance of bus design is shown by a study in London that suggested the introduction of these buses along with a free pass has led to widespread use of bus services for people aged 60 and over and for the younger disabled (Schmöcker, Quddus, Noland, & Bell, 2008). However, there is still room for more research and widespread use of inclusive principles. For instance, research commissioned by Age UK shows that over 800 older people per day fall on a bus and nearly two million are concerned about falling while a passenger (Department for Transport, 2012). Likewise, it is reported that

frequently wheelchair users face problems because Wheelchair spaces onboard are frequently occupied by baby buggies (Transport for all, 2014).

2.4.3 User Capabilities and task demand

Designing for inclusion requires knowledge and data about the capabilities, needs and aspirations of users (Langdon, Johnson, Huppert, & Clarkson, 2013) because when interacting with a product or service they are typically required to use their capabilities to perceive, think and act (Clarkson et al., 2007). Literature in Inclusive Design has defined the following capability categories that are useful in assessing the ability that a product demands in order to use it (Clarkson et al., 2013):

- **Vision:** ‘the ability to use the colour and brightness of light to detect objects, discriminate between different surfaces or see the detail on a surface’;
- **Hearing:** ‘the ability to discriminate specific tones or speech from ambient noise and to tell where the sounds are coming from’;
- **Thinking:** ‘the ability to process information, hold attention, communicate, store and retrieve memories and select appropriate responses and actions’;
- **Reach & dexterity:** ‘the ability to reach one or both hands above the head, out in front, down to the floor, perform fine finger manipulation and carry objects’.
- **Mobility:** ‘the ability to move around, climb steps and balance independently’

Based on Human Factors and Ergonomics approach, and on the concepts of user capability and product demand, Persad, Langdon, & Clarkson (2007) developed the Capability-demand theory (shown diagrammatically in Figure 2.4). This is an analytical evaluation framework to assess user-product compatibility. The use of this framework enables an understanding and description of the demand made by products and services on their users.

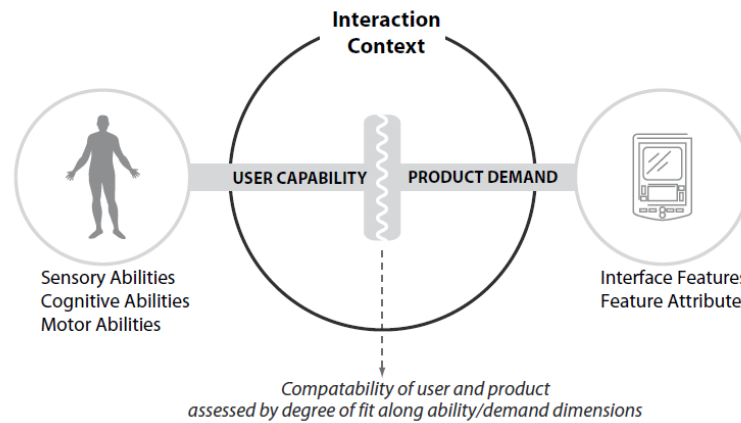


Figure 2.4 The interaction between user capabilities and product demand (Persad et al., 2007)

However, a central point of discussion is the lack of accurate user capability databases and adequate methods for gathering capability data (Johnson et al., 2010; Langdon et al., 2013). With the intention of ascertaining how capability can be measured, Johnson et al. (2010) reviewed a number of methods, among them self-report and performance measures. He concluded that self-report measures of capability can potentially provide access to physiological, environmental, cultural and attitudinal components of capability, but it can be affected by personal factors such as education, language and social differences. Contrariwise, performance measures have been argued to be more reliable and more able to accurately measure ability at higher levels. Nevertheless, Langdon et al. (2013) suggest that in order to improve representativeness of disability in a survey, both type of methods should be carried out. Moreover, data should be collected within artificial and natural context of the tasks.

2.4.4 Design exclusion

Since the products, services and environments with which people interact are, on the whole man-made, people who experience incompatibility using them can be said to be excluded by design (Coleman & Myerson, 2001). 'Exclusion results if any of the sensory, cognitive or motor demands of the task exceed any of the corresponding user abilities' (Clarkson et al., 2013). Design exclusion has been defined as the 'inability to use a product, service or facility most commonly because the needs of people who experience motor, sensory and cognitive impairments have not been taken into account during the design process' (BS 7000-6, 2005:7). Such exclusion often arises when designers do not take appropriate account of the end user's functional capabilities when making design decisions (Keates & Clarkson, 2003). Every design decision has the

potential to include or exclude customers (Waller, Bradley, Hosking, & Clarkson, 2013). Therefore, 'design exclusion does not come about by chance; it comes about through neglect, ignorance, and lack of adequate information and data' (Cassim, Coleman, Clarkson, & Dong, 2007).

Thus, given declining functionality due to the ageing process (e.g. increases in motor, visual, auditory, cognitive, or health limitations), it is common that the gap between personal abilities and environmental demands becomes wider (Rogers et al., 1998; Seidel et al., 2009). Consequently many older and disabled people can be deprived of using products or services, and also of participation in social life activities as a result of a lack of compatibility between the environment (products and services) demands and their own changing capabilities (Clarkson et al., 2013; Coleman & Myerson, 2001). Coleman (2006) suggests that reducing and eliminating design exclusion is necessary not just from a social perspective (improving life quality for older, disabled people), but also for business growth through new (and better) products and services.

2.4.5 User data representation in Inclusive Design

An overview of the history of Inclusive design in the UK (Clarkson & Coleman, 2013) has identified that this approach has generated knowledge related to user capabilities and design exclusion. There are a number of means by which such data can be represented such as HADRIAN (Human Anthropometric Data Requirements Investigation and Analysis) (Marshall et al., 2010); the Inclusive design Toolkit (Clarkson et al., 2011); and the development, use and evaluation of personas (Clarkson et al., 2007; Marshall et al., 2013). Nevertheless, even though these tools are a big step forward, they fail to consider capability in real-life environments (Elton & Nicolle, 2012).

The intention behind these efforts is to help designers in getting a better understanding of user capabilities. It is known that due to the time pressures in the work performed by design consultancies, there is not much time to run studies to gain understanding of user needs (Marshall et al., 2013). Moreover, it is also acknowledged that designers are keener to use visual data rather than reading data from documents (Dong et al., 2013).

Overall, despite the development of several tools for user data representation, Dong et al. (2013) argue that there is currently a lack of tools that support effective use of user data, and suggest that an inclusive design research methodology should be adopted in

developing such tools. In doing so, Clarkson & Coleman (2013) describe the steps followed in developing inclusive design tools, namely:

- 1) ‘Understand the capability demand made by a product within its operating environment;
- 2) Define a specification for and collect new population based capability data;
- 3) Calculate levels of product exclusion and difficulty; and
- 4) Present such data in an accessible and useful way’.

2.4.6 Summary of contribution to thesis

The literature within the section above provides knowledge as to how Inclusive Design contributes with philosophical principles, methods and tools in designing inclusive services. Firstly, the social disability model enables a better understanding of the origin of people’s disability by placing responsibility for this on the design of the environment. This aligns with the concept of design exclusion which seeks to identify why and how users cannot access or satisfactorily use a product or service i.e. how the environment fails them.

The main contribution of Inclusive Design to the approach used and developed in this thesis is its philosophy in considering the needs and capabilities of as many people as reasonably possible, irrespective of age or disability, in the design process. Its essential idea is that the consideration of a broader range of users results in better designed products or services. This is the core principle underpinning this thesis and it has been used throughout this research project, for instance data relating to both younger and older peoples’ perspectives relating to bus use were gathered. Since bus services are used by a variety of users with different capabilities, needs, and expectations, Inclusive Design is of significant relevance in evaluating and designing these services.

The capability-demand theory offers a very useful approach in evaluating user interactions with the bus service. It provides a framework for assessing service interactions, suggesting that interactions should be designed in terms of user capabilities and needs. In connection with assessing capabilities, it has been recommended that both self-reporting and performance measures are used (Langdon et al. 2013)

The Inclusive Design literature also highlights the need for tools for user data representation that consider the environment of use and it suggests the steps in

designing such tools. Langdon et al. (2013) state that among the research requirements for inclusive design, there is a need of ‘better descriptions of the demands made by products and services on the user, linked to more accurate data about users, represented in designer-friendly formats’. Consequently, this research aims to investigate the demands made by the bus service on younger and older users, along with an investigation of the gap between what these groups of users need and what service operators actually provide.

In addition, it should be said that inclusive design is now a well-established discipline in the context of developed countries. Notwithstanding, there is less presence of this discipline in developing countries, where undoubtedly there is a huge need for the inclusion of older and disabled people. As Cassim et al. (2007:9) state ‘If we are to see radical new developments in the more mature era of inclusive design that we are now entering, it will be in those less advantaged and resourced communities in the developing world’.

2.5 Conclusions

This chapter has described the conceptual background of the research undertaken and presented in this thesis. The aim of this literature review was to explore the potential contributions from Service Design and Inclusive Design in integrating an inclusive service approach for investigating and designing inclusive services. Additionally, it also aimed to identify the criteria which can be used to assess and design an inclusive bus service as well as to access the current knowledge related to ageing and public transport use, particularly the bus services.

The key aspects which have been derived from the literature review which will be used to inform the remainder of the thesis are:

1. From the literature of ageing and transport:

- Bus services must meet certain criteria such as affordability, availability, accessibility, usability and safety in order to be used by older people. However, it is also imperative that the service organisation staff have a strong commitment and awareness to the principles that guarantee that services are available and accessible to all consumers equally.
- A number of studies relating to ageing and transport have identified a series of barriers that prevent or impose difficulties in using the bus service for older

people. However, there are still some gaps in the research published to date, e.g. a) it appears that little research has been undertaken in developing countries; b) there are a lack of studies investigating whether older people have different needs to younger people in using bus services; c) there are a lack of studies which use a combination of research methods or employ methods extending beyond focus groups, interviews and surveys; and, e) little research has been undertaken using a more holistic approach.

2. From the literature of Service design

- Service Design provides a framework for considering the design of the bus service in a holistic manner. It links to the Human Factors underpinning of the thesis since in undertaking this holistic approach it recognises that all the human elements within the system (stakeholders) need to be considered.
- The Service Design domain provides the principles of 'human-centred', 'co-creative', 'sequencing', 'evidencing' and 'holistic' (Meroni & Sangiorgi, 2011; Stickdorn & Schneider, 2010). In addition, visualisation techniques are broadly used in Service Design and they are fundamental components to an inclusive service design approach.

3. From the literature of Inclusive design

- Inclusive Design provides a framework for considering the capabilities of the broad range of users who will use this public service. It links to the Human Factors underpinning of the thesis since it recognises that a good fit between the users and the system is dependent upon a full understanding of the capabilities of all users and ensuring that these are not exceeded by the design of the bus service at the points of user interaction.
- Inclusive Design offers its principle of inclusion which focusses on 'design of mainstream products and/or services that are accessible to, and usable by, people with the widest range of abilities within the widest range of situations without the need for special adaptation or design' (BS 7000-6, 2005).
- In addition, Inclusive Design provides the capability-demand theory that helps in understanding the capabilities of users.

Therefore principles, methods and tools from Service Design and Inclusive Design can be combined and used as an approach in investigating and designing inclusive services. Both approaches –Inclusive Design and Service Design- appear to be complementary in this respect.

In addition, the literature review suggested a number of key methodological points, which were used to guide the approach taken in the next part of the thesis:

- The need to investigate the context of the service and obtain the stakeholders' perspective,
- The need to acquire an understanding of all bus service elements that influence younger and older people's experience,
- The need to employ a mixed methodology to gain an understanding of user needs and to assess younger and older user's capabilities, needs and aspirations and the demand that use of the bus exerts. In connection with assessing capabilities, it has been recommended that both self-reporting and performance measures are used (Langdon et al. 2013),
- The need to provide representations of the demands made by the bus service on the younger and older users in appropriate formats.

Chapter 3 Research approach

3.1 Chapter overview

This chapter presents the research approach employed to address the research questions. This thesis embraced a mixed method approach, including both quantitative and qualitative studies. This chapter comprises a brief description of the research approaches (quantitative and qualitative) and the main features of the mixed methods approach. The last section of the chapter covers the rationale for the design research within this thesis. The methods used in the individual empirical studies are described in the methods sections of each chapter, and not described again in detail here

3.2 Research approaches

Quantitative and qualitative research have been traditionally considered the alternatives when carrying out social research (Robson, 2011). These approaches articulate assumptions that are consistent with what is called positivist and interpretivist philosophies respectively. Positivism and interpretivism are different paradigms, i.e. different ways to see the world, therefore represent different options for undertaking research. Table 3.1 gives a summary of the main differences between these paradigms.

Table 3.1 A summary of the key features of quantitative and qualitative paradigms (based on (Sale, Lohfeld, & Brazil, 2002))

	Quantitative approach	Qualitative approach
Ontological position	There is only one truth, an objective reality that exists independent of human perception	There are multiple realities or multiple truths based on one's construction of reality.
Epistemological position	The investigator and investigated are independent entities. Therefore, the investigator is capable of studying a phenomenon without influencing it or being influenced by it	The investigator and the object of study are interactively linked so that findings are mutually created within the context of the situation which shapes the inquiry
Goal	To measure and analyse causal relationships between variables within a value-free framework	The emphasis is on process and meanings.
Techniques	Randomization, blinding, highly structured protocols, and written or orally administered questionnaires with a limited range of predetermined responses.	In-depth and focus group interviews and participant observation.
Sample sizes	Large samples to ensure they are Representative	Small, purposeful samples are used because they can provide important information

Over the last century, researchers from each of these paradigms have engaged in dispute, arguing their own view as the ideal for research, and some researchers from both approaches advocate these paradigms are incompatible (Onwuegbuzie & Leech, 2005). However, some researchers state that there are more similarities between quantitative and qualitative perspectives than differences - e.g. see Johnson, Onwuegbuzie, & Turner (2007); Onwuegbuzie & Leech (2005). Similarly, over the last four decades there have been researchers and methodologists who believe that the use of both quantitative and qualitative viewpoints is useful in tackling their research questions (Johnson et al., 2007). This pragmatic position gave origin to the mixed method approach (Johnson & Onwuegbuzie, 2004). According to Johnson & Onwuegbuzie (2004) the mixed methods approach does not aim to solve the philosophical and methodological differences between quantitative and qualitative paradigms, instead this approach uses the pragmatic method and system of philosophy to blend together the insights coming by qualitative and quantitative research into a practical solution.

However, to blend research and insights in an effective manner within a mixed methods approach, Johnson & Onwuegbuzie (2004) point out that researchers first need to know the relevant characteristics of quantitative and qualitative research paradigms; i.e.

deduction, confirmation, theory/hypothesis testing, explanation, prediction, standardized data collection, and statistical analysis from the quantitative tradition; and, induction, discovery, exploration, theory/hypothesis generation, and techniques of data collection and analysis from the qualitative point of view.

3.3 Mixed methods approach

Mixed methods approach is recognised as the third major research approach or research paradigm (Creswell, 2013; Johnson et al., 2007), underpinned in its *fundamental principle* (Johnson & Onwuegbuzie, 2004) that research ‘should strategically combine qualitative and quantitative methods, approaches, and concepts in a way that produces complementary strengths and non-overlapping weaknesses’ (Johnson et al., 2007:127). As a new practice there are still variations and inconsistencies within the paradigm (Denscombe, 2008). As example of this, there are inconsistencies in the way mixed methods are defined and conceptualised (Tashakkori & Creswell, 2007), but also related to what and how methods should be mixed or the reasons for doing so (Denscombe, 2008; Johnson et al., 2007). However, there are some definitions that have been highly widely used within mixed methods. One of these definitions is provided by Creswell & Plano Clark (2011:5), who state that

‘Mixed methods research is a research design with philosophical assumptions as well as methods of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and analysis and the mixture of qualitative and quantitative approaches in many phases of the research process. As a method, it focusses on collecting, analyzing, and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches, in combination, provides a better understanding of research problems than either research alone’

In terms of the purpose of using a mixed methods approach, Greene, Caracelli, & Graham (1989:259) identified a list of major purposes, namely: 1) *Triangulation* (i.e. looking for convergence and corroboration of results from the different methods); 2) *Complementarity* (i.e. looking for elaboration, enhancement, and clarification of the results from one method with the results from the other; 3) *Development* (i.e. looking

for the use of results from one method to help develop or inform the other method); 4) *Initiation* (i.e. looking for the discovery of paradox and contradictions that help to adjust the research questions), and 5) *Expansion* (i.e. looking for extending the breadth and range of inquiry by using different methods for different inquiry components). This classification of purposes will be used in Section 3.5 to underline the intention of using mixed method in this thesis.

3.3.1.1 Typology of Mixed Research Methods

According to Johnson & Onwuegbuzie (2004) the majority of mixed methods research designs can be classified within two major types: 1) mixed-model and 2) mixed-method designs. Mixed-model designs include mixing qualitative and quantitative approaches within and/or across the stages in a single study. Figure 3.1 shows some examples of mixed-model designs; designs from two to seven are ‘across-stage mixed-model designs’. An example of a mixed-model design within stage may include combining qualitative and quantitative strategies inside of any stage of the study, e.g. collect or analyse both type of data in the same study.

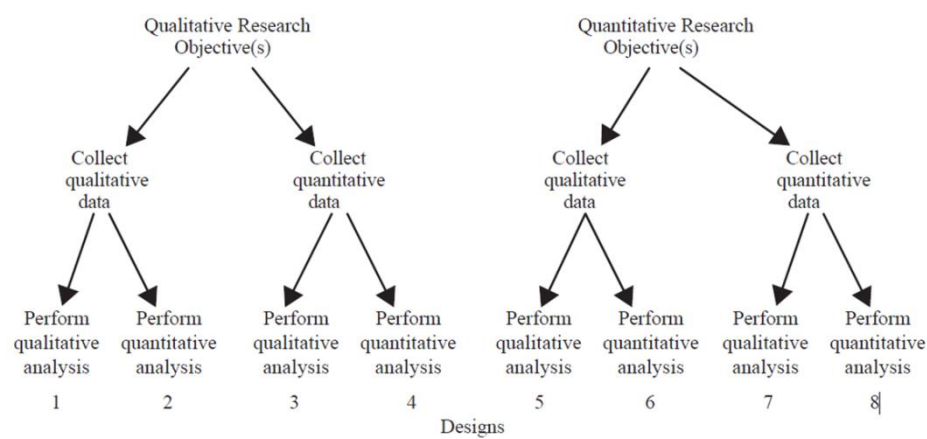


Figure 3.1 Monomethod and mixed-model designs (R. Johnson & Onwuegbuzie, 2004)

Mixed–method designs comprise the inclusion of a quantitative phase and a qualitative phase in an overall research study. According to the time order decision and purpose, the mixed-methods design may be sequential, concurrent or transformative (Creswell, 2013). Table 3.2 presents the main characteristics of these research designs.

Table 3.2 Mixed-method design classification (based on Creswell, 2013)

Type	Purpose	Time order
Sequential procedure	The researcher seeks to elaborate on or expand the findings of one method with another method.	This may involve beginning with a qualitative method and following up with a quantitative method with a large sample so that it can generalize results to a population. Alternatively, it may begin with a quantitative method, to be followed by a qualitative method involving detailed exploration with a few cases or individuals.
Concurrent procedure	The researcher converges quantitative and qualitative data in order to provide a comprehensive analysis of the research problem	The investigator collects both forms of data at the same time during the study and then integrates the information in the interpretation of the overall results.
Transformative procedure	The researcher uses theoretical lens as an overarching perspective within a design that contains both types of data.	The lens provides a framework for topics of interest, methods for collecting data, and outcomes or changes anticipated by the study. Within this lens could be a data collection method that involves a sequential or a concurrent approach.

3.4 Overview of the mixed method approach in this thesis

Table 3.3 gives an overview of how the mixed method approach was used within this research. In addition to the research stages, the number of the chapter in the thesis, and the type of the study and participants, the table shows when and where there is a mixing of qualitative and quantitative approaches. The use of capital letters (QUAN - QUAL) or lowercase letter (quan – qual) represents the priority given to the quantitative and qualitative data in the objective (s), data collection or data analysis in each study. The order and purpose of including the studies to address the research questions will be described in the following sections.

Table 3.3 Overview of the use of mixed method approach within the thesis

Studies	Methods applied	Participants	Objective(s)	Data Collection	Data analysis
Research Stage 1					
Chapter 4	Stakeholder individual and group interviews	33 stakeholders: 10 individual interviews and 5 group interviews	QUAL	QUAL	QUAL
	Documentary analysis	Documents: Legislation, plans and programmes, newspapers.	QUAL	QUAL	QUAL
Chapter 5	Structured Focus Groups (with card sorting technique)	17 younger people took part in three focus groups 26 older people took part in four focus groups	Quan+QUAL	Quan+QUAL	Quan+QUAL
Chapter 6	Journey observations (Unobtrusive and structured)	333 passengers were observed when boarding, travelling and alighting the bus: 189 younger and 144 older passengers	QUAN+Qual	QUAN+Qual	QUAN+Qual
Chapter 7	Accompanied Journeys (Pre-journey interview + participant observation + recall interviews)	12 older participants took part in a door-to-door journey research strategy	QUAL	QUAL	QUAL+Quan
Research Stage 2					
Chapter 9	Evaluation Workshops	80 participants from seven different stakeholders groups. Seven workshops	QUAN+Qual	QUAN+Qual	QUAN+Qual

3.5 Designing the research methodology within this thesis

This section describes the methods chosen for tackling the research questions in this thesis, focusing on the inclusive service perspective, the gaps on the research area and on the mixed-methods approach. The details of each study are covered in the relevant chapters.

Research Question 1

What are the theoretical and methodological elements of Inclusive Design and Service Design that can be integrated to contribute to evaluating and designing for inclusive services?

This question was tackled by undertaking a literature review looking at the philosophical principles, methods and practices of both design domains, and the possibilities of integrating them in designing for inclusive services. The literature review was mostly undertaken at the beginning of this research process and provided direction for the empirical work. This included the holistic and inclusive approach used in understanding users' needs and the current bus service provision, and for the development of the inclusive service blueprint tool (used in the last study).

The literature review looking at the integration of Inclusive Design and Service Design is described in Chapter 2.

Research Question 2

What are the issues that prevent the bus service being safe, usable and desirable for passengers, and what is the demand that these issues place on younger and older users?

This is the question that connects this investigation with the 'real world' research. It is also a very broad question that enabled use of diverse research strategies to tackle it. A literature review was undertaken to find out the current knowledge on ageing and bus use, which is described in Chapter 2. The review highlighted some gaps in this subject as the lack of research in developing countries and studies that compare younger and older people's needs in using the bus service. Similarly, it was identified that there is a scarcity of studies with a service approach, but also that most of the studies have been

undertaken with the use of single methods such as interviews or focus groups as the primary source of data. Although these methods are useful, they lack the objectivity in data collection that is desirable, particularly in terms of presenting evidence to stakeholders to promote service improvement. These research gaps along with the inclusive service approach used in this investigation suggested the need for using a mixed method approach. Figure 3.2 illustrates the sequential mixed methods design used to tackle this research question. Rectangles in white comprise the methods and purple rectangles suggest the priority given to the quantitative and qualitative data in the objective (s) of each study.

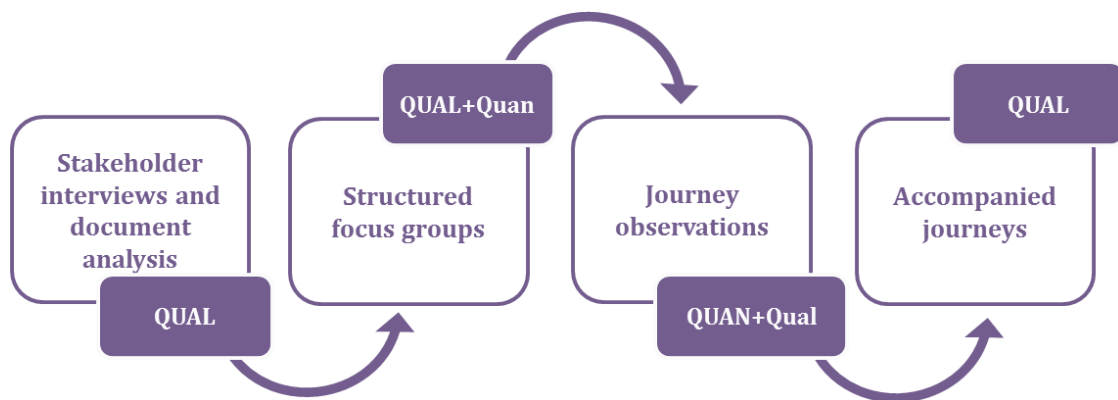


Figure 3.2 Sequential exploratory mixed methods design to answer RQ2

Inclusive Design and Service Design suggest that the process of designing a product or service starts by gaining a clear understanding of the user's needs (Clarkson et al., 2007; Stickdorn, 2010c), but understanding the context in which the service is operating is also critical (Langdon et al., 2013; Polaine et al., 2013). Consequently, the first study comprised a series of individual and group interviews to develop understanding of the service context. In addition, a documentary analysis was used in order to corroborate (*triangulation*) and clarify (*complementarity*) findings from the interviews. This study offered a 'snapshot' of the context in which the bus service is operating, but it did not provide the users' perspective on the service.

The use of stakeholder interviews and document analysis to contribute in tackling this research question is described in Chapter 4.

In order to determine the views of younger and older people on the problematic aspects of the bus service, an exploratory study using focus groups was undertaken. Qualitative research has been suggested as a very helpful tool in the design process because it

enables understanding of people's needs, behaviours, and motivations (Polaine et al., 2013). Despite the qualitative nature of the study objective, a card sorting strategy was used to prioritise (quantify) the issues that impose greatest difficulties in using the service. Based on the participants' self-reports, it was found that each group of participants prioritised differently the issues that impose greatest difficulties for that group. These findings revealed that given the demands imposed by the bus service and the reduced capabilities associated with ageing, the gap between what users need and want and what the service provider offers was wider for older people. However, even though self-report from individuals can potentially help to understand user's capability (Langdon et al., 2013), performance measures and observation were also needed to achieve a more comprehensive view (*development and complementarity*) of the variation between these age groups and to corroborate (*triangulation*) the self-reports.

The third study, the journey observations aimed to ascertain the differences in the behaviours of younger and older passengers when boarding, travelling on, and alighting buses and to investigate differences in the gap between the personal abilities of these groups of passengers considering the demand that using the bus exerts. Johnson, Clarkson, & Huppert (2010) and Langdon et al. (2013) have suggested that combinations of individual self-report and performance measures provide better understanding of users' capabilities. Results from this study enabled comparison and enrichment of the findings from the focus groups (*triangulation and complementarity*). However, the study was able to observe behaviour on buses, but not to investigate other barriers related to the door to door experience, in order to obtain a deep understanding of the impact of using the service on the older users' experience.

The use of an ethnographic strategy through a series of accompanied journeys with older people was used to gain a deeper understanding of the barriers that older people face in a door-to-door journey. Ethnographic strategies have been adopted as one of the most commonly employed research approaches in the design of services (Stickdorn & Schneider, 2010:129). The design of this study was built on the results of the previous studies (*development*) and enabled not only corroboration and clarification of results (*triangulation and complementarity*), but also understanding of how older people felt when actually undertaking a door-to-door journey (*expansion*).

The use of structured focus groups, journeys observation and accompanied journeys are described in Chapters 5, 6 and 7 respectively.

Research Question 3

How can Service Design and Inclusive Design help to represent users' capabilities, needs and expectations and contribute to design for inclusive services?

Literature review was useful to tackle this question since it describes current practices for both domains in terms of data visualisation (Service Design) and representation of user capabilities (Inclusive design). It was found that visualisations are used in the design research phase as tools for translating raw data into insights and as a way to communicate insights (Segelström & Holmlid, 2009), and that blueprints are the most common and useful tools when improving a service (Segelström, 2009). Literature from Inclusive Design suggested some guidelines for developing representation tools to be used in the design process. The use of both disciplinary design practices allowed developing an inclusive service blueprint to represent the younger and older users' experience of the current service provision.

The development of the inclusive service blueprint is described in Chapter 8.

The visualisation tool helped to tackle the first part of the research question. The second part of the question was tackled through a study that aimed to evaluate the use of the inclusive service approach and blueprint tool. Although the approach and blueprint could have been evaluated by academics or experts from both domains, the main purpose of this study was to put the approach and blueprint in the context where data was generated, and obtain feedback from the service stakeholders. To acquire stakeholders' feedback, a study using evaluation workshops was undertaken. These sorts of workshops are common in evaluating outcomes from the design process (Maguire, 2001).

The details of the evaluation workshops study are described in Chapter 9.

3.6 Chapter summary

This chapter described the research approach adopted in this thesis, and the methods used in the process to address the three research questions. The benefits and challenges of using this research approach will be discussed in the discussion chapter. The details of the application of each method, analysis, results and discussion are given in Chapters 4, 5, 6 and 7 for stage 1 (Discover), and Chapter 8 and 9 for the stage 2 (Translate). The overall research design of this thesis is summarised in Figure 3.3.

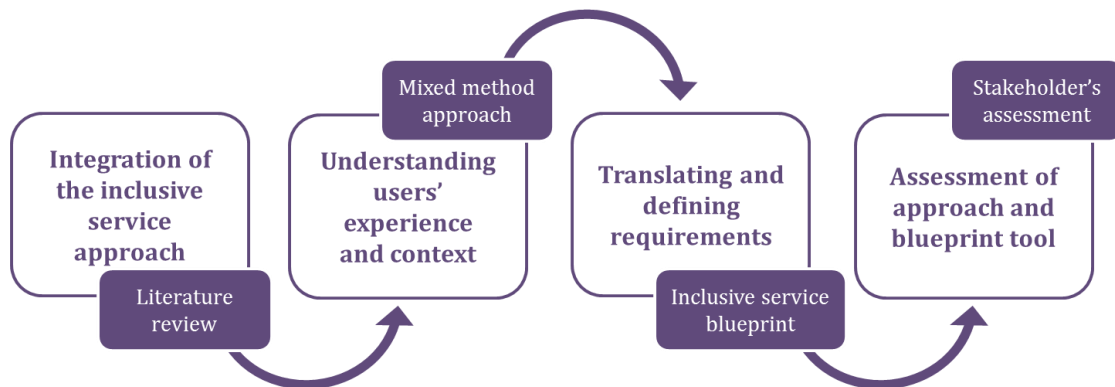


Figure 3.3 Overview of the research design within this thesis

Chapter 4 Understanding the bus system

4.1 Introduction

As stated in the literature review, the process of designing a service starts by gaining a clear understanding of the user's needs (Clarkson et al., 2007; Stickdorn, 2010c), but understanding the context in which the service is operating is also critical to gathering insights into peoples' interactions with service touch-points (Holmlid, 2011; Polaine et al., 2013; Stickdorn & Schneider, 2010). The use of the inclusive service design approach naturally extended this research beyond the users to consider the needs of, and contributions made by, other stakeholders thereby enabling an understanding of the broader context of the service to be gleaned. It is important to obtain this big picture view since it assists in identifying elements within the service which may directly impact the users' experience and which, in the future, may need to be overcome to facilitate improvements. This study addressed this wider perspective by focussing on obtaining a 'snapshot' of the broader service operation and this knowledge will be complemented in the following three chapters to cover the requirement to understand the users' needs.

The research strategy used in this study comprised two methods that were used to generate knowledge regarding the service context. The first method related to consultations with a range of stakeholder groups in the form of individual and group interviews, whilst the second related to a document analysis of relevant items in the public domain. In this way the design and operation of the service could be better understood from the context of political and legal requirements through to in-practice considerations.

This 'snapshot' of the service operation was used to set the context for the research, ensuring a better understanding of users' experience (described in Chapter 5, 6, and 7), as well as the experience and needs of people involved in the service provision, e.g. drivers. Furthermore, results from this study were used to build the 'backstage' knowledge of the service design process and contribute to the inclusive service blueprint employed in the second stage of this research (Chapter 8)

4.2 Aims and objectives

The aims of this study were to gain a sense of the context in which the bus service was operating and, explore the presence of constraints in the service provision and why they were occurring.

Objectives:

- To identify the main stakeholders that are part of or are affected by the service
- To describe the main characteristics of the bus service
- To investigate the main issues that prevent delivery of an inclusive service

4.3 Study Rationale

4.3.1 Choice of methodology

Since the aims of this study were to gain a sense of the context in which the bus service is operating and explore the presence of constraints in the service provision, a series of semi-structured interviews and a documentary analysis were used. A general overview of the service could be obtained online from the main newspapers in the city, but in order to get a better understanding of the service operation, more information was necessary. In order to gain a better overview of the elements and context of the service, the main service stakeholders were the focus of this study. Given the exploratory nature of the research, interviews were an appropriate method to use. Therefore a series of group and individual semi-structured interviews were therefore held with key stakeholders who were considered to be the most well-informed about the service provision. These interviews were specifically designed to obtain the interviewees' viewpoints about the service operation, and were structured around a set of predetermined open-ended questions (DiCicco-Bloom & Crabtree, 2006), but more questions emerged within the interview itself.

Along with the interviews, a content and thematic analysis of some documents was used in order to complement and/or contrast the information provided by participants. The rationale for document analysis is that can be used as supplementary method and for data triangulation purposes (Bowen, 2009; Robson, 2011). Documents included in the analysis were newspapers, laws and regulations, and some special documents produced by the government and Non-Governmental Organisations. The main reasons for using these documents were because they cover a wide range of aspects of the system and

were available in the public domain to be consulted. Whilst published studies had been very useful, little research had been undertaken from a system perspective.

4.4 Methods

4.4.1 Overview

This was a qualitative, exploratory study, which included a series of group and individual semi-structured interviews with stakeholders, as well as a document analysis. Data were analysed to give an overview of the bus service characteristics: main actors, routes, bus design, and regulation, among others. It was also aimed to explore the presence of constraints in the service provision and why they are occurring. The results were interpreted in terms of how those characteristics and constraints may reduce safety, usability and desirability from the point of view of the users.

4.4.1.1 Participants – Overview of the stakeholders

At the beginning of this study and based on previous knowledge of the bus system, some key stakeholders were defined:

- Users – (whom will also be the focus of the following three chapters)
- Local authorities – related to public transport and/or older people
- Service operators – bus companies, bus organizations and/or bus owners
- Bus drivers
- Bus manufacturing companies – designers and managers
- Non-Governmental Organisations – working in favour of public transport improvements

From the above stakeholder list, the following 10 people were interviewed for this study. For each group, the position of the interviewee(s) and the organisation they represented is given below (in brackets is the organisation's name in Spanish):

- Director of Motorised Mobility, Mobility and Transport Institute (*Instituto de Movilidad y Transporte*)
- Director of the Metropolitan Centre for Older People, (*Centro Metropolitano del Adulto Mayor*)
- One owner of two buses, member of a bus company (TUTSA)
- Leader of the one of the biggest organisations of service operators, (*Frente Unido de Subrogatarios y Concesionarios del Estado de Jalisco*)
- Two bus drivers of SyT bus company (*Servicios y Transportes*)
- The designer in chief of *Beccar*, Co., a bus manufacturing company
- The engineer of a manufacturer of *DINA*, Co., a bus manufacturing company

- A representative of an environmentalist organisation, (*Colectivo Ecologista de Jalisco*)
- A representative of an organisation in favour of city improvements, (*Ciudad para todos*)
- A representative of an organisation in favour of older and disabled people, (*Red Ciudadana*)

Additionally to these individual interviews, five group interviews were held with people of those organizations or companies. A total of 33 participants took part either individually or in a meeting session.

4.4.1.2 Participants – Description of the Stakeholders

In this section, the main issues concerning each stakeholder are described, including their central role in the system, relationships with other stakeholders, performance criteria and reasons to deliver a good performance, among other characteristics.

Local Authorities

The local authority involved in bus service provision is represented through the Ministry of Mobility (SEMOV, according to its designation in Spanish). The main responsibility of this ministry is to regulate, coordinate and control all the issues related to the mobility and the use of roads in the city. The regulation of public transport is one of its responsibilities and to fulfil this duty the Ministry is helped by the Mobility and Transport Institute (IMTJ, according to its designation in Spanish). The primary purpose of IMTJ is to promote sustainable mobility and transport through the development and implementation of planning actions, projects, design, research and monitoring of mobility and transportation of people in the city and state.

Both the SEMOV and the IMTJ are related to other stakeholders and this relationship varies according to the nature of each stakeholder. For instance, the connection with the service operators is given as they have to agree about regulations, quality of the service, cost of the service, etc. The Ministry of Transport is related to the bus drivers through the bus operators, but also through a traffic police which monitors and controls how bus drivers drive and behave. There is an indirect relationship with bus manufacturing companies, which is given through the official standards for the bus design. The contact with NGOs is usually due to actions which those organisations are pursuing to improve the transport service. Additionally, there is a relationship with the media (television, radio and newspapers), who usually monitor events happening in the city.

Beyond the public perception whether the bus service is running well or not, which is frequently influenced by the media, it seems that there are no clear performance criteria for the actions of the local authority. However, government officials always state their allegiance towards users because such users represent the votes in election, which will be beneficial to them.

On the other hand, there are some agencies within the local authorities who were considered in this study due to their interest in helping older people. Thus, the System for the Integral Development of the Family (DIF, according to its designation in Spanish) aims to help older people enjoy a better quality of life and runs programmes to keep older people more healthy and active. These programs are presented in different ways, for instance through the operation of day community centres. Nevertheless, some officials from this agency recognise that the lack of a good transport service prevents older people attending and using these day centres. However, even though the DIF is part of the local authority, it does not have much influence on the development of public transport policy.

Service operators

Undoubtedly, service operators are one of main stakeholders and have a strong influence on the bus service operation. There are in the order of 14 bus companies, two of which belong and/or are managed by the government and the rest are private businesses. One of the main characteristics of these companies is their informal organisation because they are formed by people who possess their own bus or buses, based on a co-operative arrangement. This organisation model is often referred as '*hombre-camion*' (man-bus), which means that each owner has a permission to operate his bus or buses (no more than three according to the legislation) and own business (Gutiérrez-Pulido et al., 2011). As result, these bus companies are characterised by a defective administration, neglecting the possibility of economies of scale in the bus service by introducing a business system. Some figures point out that there are about 5179 buses from which 85% are operated under the *hombre-camion* scheme (IMTJ, 2013). Bus operators seek to maximise profits, which usually results in competition instead of collaborating to provide a good quality service to users and society (Gutiérrez-Pulido et al., 2011).

The bus operators relate to other stakeholders in a number of ways. They maintain a particular relationship with the local authority, which varies according to the political agenda at the time. However, government and bus operators should strive to reach some agreement in terms of regulations of the service. The story begins when bus operators, arguing that all the costs have increased, ask to raise the price for using the bus service. The government officials reply that the bus service presents a lack of quality; hence, the price of the service should not be increased. The bus operators then apply political pressures, such as a bus stoppage; and eventually, the bus operators and government agree, subject to improvements to the service, to increase the price for users. Nevertheless, with very rare exceptions, most of these agreements never have been fulfilled (Silva, 2013).

Bus operators are directly related to the bus drivers, whom they control through their salary. There is commercial relationship with the bus manufacturing companies where these stakeholders reach some agreements in terms of the cost of buses. There is less contact between bus operators and users or NGOs due to the lack of channels to do so.

The operators are responsible for providing the minimal elements to run the bus service which are usually the bus and the bus driver. Although, there are some criteria for good service performance (e.g. frequency and time to complete a journey), there is not a good system for monitoring these criteria. Additionally bus companies know that users must use the service because they do not have other options. However, over the last years some bus operators have come to realise that fewer and fewer people are willing to use the service, with more and more people in the city moving to use of the private car (Gutiérrez-Pulido et al., 2011).

Bus drivers

Bus drivers are the key actors in providing the service to users. According to the bus operators, there are approximately 10,000 bus drivers delivering the service in the city (IMTJ, 2013). Among the main concerns of this group of stakeholders are, firstly, the desire to obtain the highest salary possible for each working day; and secondly, the improvement of their working conditions.

Bus drivers have a direct relationship with user to whom they offer the service. This is a tense relationship because it is characterized by the pressure of time, the large number of passengers using the service, and a questionable driving style. Passengers often

perceive the drivers as the only responsible people for the quality of the service. In contrast, bus drivers are influenced and controlled by the large number of bus operators (data are not available, but it is estimated that they are around 4300) who control the bus drivers' working conditions. Whilst every bus owner or operator could have different ideas about how to run the service, in reality it is common practice that most bus drivers 'race' to pick up as many users as they can since they are paid pro-rata to the number of passengers they collect (Access Exchange International, 2009).

Bus drivers are also controlled by the local authority through the traffic police. This sort of police is compelled to ensure that bus drivers are complying with the law, which creates another problematic relationship because bus drivers –and some bus operators– perceive that there is a discretionary application of the criteria by the police officers. On the other hand, it seems that bus drivers have no connection with bus manufacturing companies, and very little contact with some of the NGOs.

It is supposed that bus drivers should deliver a good quality service, but there are not clear criteria what that means. Overall, drivers should drive for, stop and collect passengers –as much as they can– and complete their route on time. This implies that as long as bus drivers complete these activities they are rewarded with their salary. There are no explicit quality standards to assess their performance, but by the end of the day, bus drivers are evaluated and paid according to the income that they report to the bus owner or company.

Bus manufacturing companies – designers and managers

There are some bus manufacturing companies who provide buses to the city. Whilst there are variances in these companies, e.g. small vs big companies, they mostly produce and sell the same sort of bus –one which is built on a truck chassis with steps to board and alight. Underpinning this situation is the demand of bus operators' market for the cheapest vehicles to buy and the official standards that the government imposes for the bus design. The performance criteria for bus manufacturing companies are given through the official standard, which is legislated and provided by the Local Chamber of Deputies. Bus manufacturers design to these standards, but if the standards do not suit all passengers there are no more incentives for manufacturers to design beyond these standards.

Bus manufactures have a commercial relationship with the bus operators, and are indirectly related to the local authorities through the accomplishment of the standards. In general, bus manufacturers are rarely in contact with the rest of the bus service stakeholders –drivers, users or NGOs. This situation implies that the voice of the main actors of the service –users and drivers- is rarely heard by the bus designers and managers of these companies.

Non-Governmental Organisations

There are several organisations which are trying to drive improvements to the mobility options in the city, and particularly within the public transport system. Generally these organisations are formed by concerned and thoughtful citizens whose reasons to participate may vary between being in favour of sustainable development or fighting for the disabled and older people's rights, but all of them claim for a better quality of life in the city. All of these organisations aim to raise the citizens' voice and want to be acknowledged by the local authorities. Even though, there are no performance criteria for these organisations, it is quite common that they are better at diagnosing problems and proposing sensible solutions.

4.4.1.3 Interview Procedure

An initial search on several websites was made to find emails or phone numbers for the key stakeholders. Aside from the bus owner and the two drivers, who were contacted in person, the first contact with the participants was established by email explaining the aims of the interview, the scope of the research project, and the general instructions to participate in the interview. In addition to the emails, some of the stakeholders were contacted by phone. The time for receiving answers back and process to reach the stakeholders were different in each case; however, all the stakeholders who were contacted were willing to take part in the interviews.

The dates for the interviews were agreed and took place in the stakeholders' premises, or alternative places that they suggested. The duration of the interviews varied from 45 minutes to 1.5 hours. Some interviews resulted in some participants proposing additional meetings with other colleagues or members of that organisation who were then interviewed when the opportunity presented itself. Recordings of every interview or meeting were made with the consent of the interviewee being obtained first.

4.4.2 Document analysis

4.4.2.1 Analysed documents

To gain a better understanding of the bus system and as a supplementary method (Robson, 2011) some documents pertaining to Laws, regulations, programmes and plans, and newspapers, among others were integrated in the analysis. The following documents were analysed (in bracket the document's name in Spanish):

National and Local Legislation

- Law on the Rights of the Elderly; (*Ley de los Derechos de las Personas Adultas Mayores* (INAPAM, 2011))
- General Law for the Inclusion of People with Disabilities; (*Ley General para la Inclusión de las Personas con Discapacidad* (Sedesol, 2011))
- Federal Law to Prevent and Eliminate Discrimination; (*Ley Federal para Prevenir y Eliminar la Discriminación* (Gobierno de Mexico, 2007))
- Law of Mobility and Transport of the State of Jalisco; (*Ley de Movilidad y Transporte del Estado de Jalisco* (Gobierno de Jalisco, 2013a))
- Law for the Integral Development of the Older Adult; (*Ley para el Desarrollo Integral del Adulto Mayor del Estado de Jalisco* (Gobierno de Jalisco, 2011))

Mobility reports, plans and programmes from local authorities and NGOs

- Especial Program of Mobility 2007-2013, from the local authority; (*Programa Especial de Movilidad 2007-2013*)
- State Development Plan – Jalisco 2013-2033, from the local authority; (*Plan Estatal de Desarrollo – Jalisco 2013-2033* (Gobierno de Jalisco, 2013b))
- Actions to promote sustainable mobility in the metropolitan area of Guadalajara, from *Colectivo Ecologista de Jalisco* and the Hewlett Foundation; (*Acciones para Promover la Movilidad Sustentable en la ZMG* (Colectivo Ecologista de Jalisco, 2007))
- Technical Report for the Review, Approval and Amendment of Fees for Public Passenger Transport, from the local authority; (*Dictamen Tecnico para la Revision, Aprobacion y Modificacion de las Tarifas de Transporte Publico de Pasajeros en sus Distintas Modalidades* (IMTJ, 2013))
- Declaration of Guadalajara - for a Sustainable Mobility, from *Plataforma Metropolitana para la Sustentabilidad*; (*Declaracion de Guadalajara – Por una Movilidad Sustentable*)

Newspapers

Some news reports from the digital version of the local newspapers were included in the analysis. The following resources were consulted:

- El Informador (<http://www.informador.com.mx/>)
- Mural (<http://www.mural.com/>)
- La Jornada Jalisco (<http://www.lajornadajalisco.com.mx/>)

4.4.3 Data analysis

4.4.3.1 Semi-structured interviews – Thematic analysis

This study comprised two different data sets which required different methods of analysis. The first part of the data analysis related to the audio recordings from the interviews and meetings. These files were imported into the QSR International NVivo software, and a thematic analysis was undertaken to explore the collected qualitative data. Based on the themes identified within the data, an inductive analysis was used (Braun & Clarke, 2006; Robson, 2011). The analysis was also undertaken at a semantic and realistic level (Braun & Clarke, 2006), which means that themes, subthemes and codes were identified within the explicit meaning of the data, considering only what participants said.

The analysis was undertaken following the procedure described by Robson (2011). Firstly -and after the transcription-, the data were read carefully in order to identify initial ideas. Secondly, extracts of text related to similar issues were selected to create the first analytical categories, which later would create the subthemes and after the themes. An extract from the text could be in more than one category.

Following this, the themes were defined from the importance of the data in relation to the research questions, and they represent some level of patterned response or meaning within the analysed data (Braun & Clarke, 2006). Once the themes, subthemes and codes were defined, the extracts were, carefully and systematically, reviewed to ensure that all of them were located in the correct code and subtheme. The fourth step included building thematic maps to allow a better understanding of how the bus service was operating.

4.4.3.2 Document analysis - content analysis and thematic analysis

The second part of the data analysis related to the examination, reading and interpretation of the documents. This process involved the combination of elements from content analysis and thematic analysis. The procedure excluded the quantification typical of conventional mass media content analysis and followed a first-pass document review to extract meaningful and relevant passages of text as suggested by Bowen (2009). Later, as part of the thematic analysis, a more focused re-reading and reviewing of data was undertaken. Codes and the themes previously defined for the interviews were used for the document analysis. However, the theme related to the mobility situation in the city emerged mainly from the document analysis.

4.5 Results and discussion

A large volume of data were obtained from the study and due to its qualitative nature, the results are summarised and discussed together. Results were classified in a total of five themes, which are presented and discussed from sections 4.5.1 to 4.5.5.

4.5.1 Current situation of the mobility in the city

A common subject in most of the stakeholders' interviews and in the analysed documents was that citizens have problems in moving around the city. This situation is recognised by the local authorities, who state that the mobility problem is serious and growing, and one of the main demographic problems to affect people (Gutiérrez-Pulido et al., 2011). Guadalajara's mobility options comprise of some modes of transport which seem to not meet the needs of most of people. Together with the non-motorised options, Figure 4.1 shows the modes available in the city.

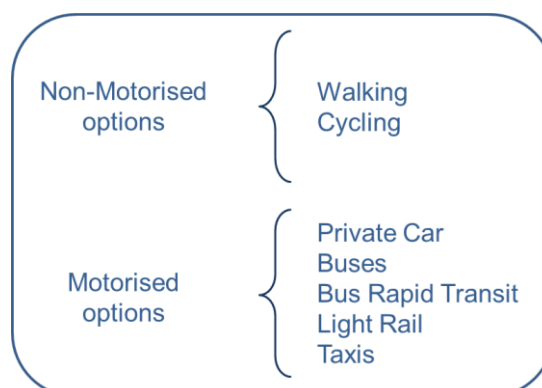


Figure 4.1 Mobility options in the city

Although there are several mobility options, the city shows a high dependency on the private car (Cordova-Espana, 2010). Lately, the use of the private car has considerably increased; for instance, over the last decade the number of private cars increased from 720,713 in 2001 to 1,782,030 cars in 2012 (Informador redaccion, 2013). Currently, an average of 380 new cars is being incorporated to the city per day in concordance to the figures provided in interview with the Local Authorities. Likewise, the urban investment in infrastructure has privileged private car mobility. Conversely, there has been little investment in other mobility options (Gobierno de Jalisco, 2013b). Some participants in this study raised this issue as a cause of several problems within the city such as traffic congestion, increased travel times, air and noise pollution, and a high rate of car accidents in the city, among others. Similarly, members of NGOs pointed out that this focus on the private car use has prevented the development of better public transport options, but at the same time the lack of a good public transport system has incentivised using the car. In any case, figures presented by the Director of the Mobility and Transport Institute indicated that in the last 11 years, public transport has lost about half of its passengers to private car use (Informador redaccion, 2013), which has been a big concern for bus operators for whom the level of profits has been reduced.

Public transport options consist of one lane of Bus Rapid Transit (BRT), two lanes of light rail, and conventional buses. It is worth noting that even though the BRT and the light rail provide a good service, these options cover only 10% of the demand of public transport. According to the leader of bus service operators, 90% of the service is delivered using conventional buses. Yet, all participants in this study recognised that the bus service is characterised by a poor quality. Furthermore, most of the documents suggested that the service presents a series of problems such as: overlapping routes, disordered growth of the system, excessive number of stops, lack of information, and deficient management (Colectivo Ecologista de Jalisco, 2007; Gobierno de Jalisco, 2013b; Gutiérrez-Pulido et al., 2011).

Despite the high rate of the car use and the lack of quality of public transport, most of the population still use this mode of transport. Results from a recent survey showed that 63% of people travel using the bus service, 22% use the private car, 6% use the BRT and light rail, and only 10% use non-motorised options like walking or cycling (Gobierno de Jalisco, 2013b; Jalisco Como Vamos, 2013). On the other hand, data from a modes of transport demand survey carried out in 2007 (SEDEUR, 2009) showed some

differences by age group (see Figure 4.2). Regarding people aged 65 and over, data suggested that the use of taxis by older people was about three times higher than the use of collective transport, which might be explained by the fact that public transport presents several barriers to use by this age group.

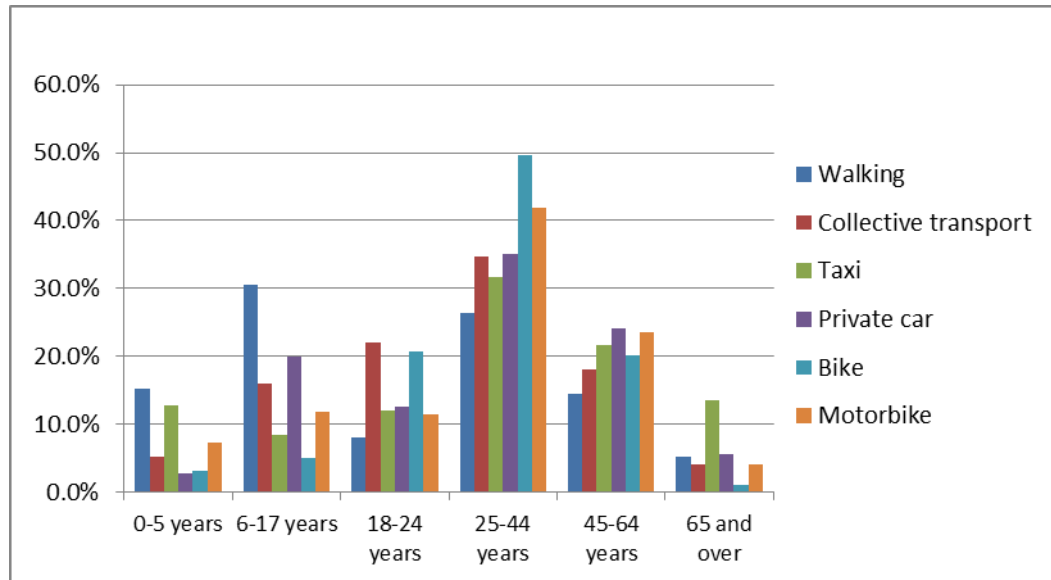


Figure 4.2 Mode of travel according to age (Source: SEDEUR, 2009)

Overall, some stakeholders raised the idea that public transport is used only by poor people i.e. those who cannot afford either to run a car or pay for a taxi. A representative of a NGO stated that there are some advertisements in the city promoting buying a car in order to avoid the use of the bus service.

4.5.2 Gaps and weaknesses on the regulation of the bus service

The bus service regulation as a topic included in the interviews with stakeholders and in the document analysis enabled an understanding of the overall regulation of the system, and regulations related to the inclusion of older and disabled people. With regard to the former, an issue raised by most of the stakeholders was the presence of weak regulation in the bus service; they stated that the operation of the bus service presents diverse irregularities. Moreover, this issue has been part of public discussion, where several actors have pointed out that there are some gaps between legislation and the application of the law, e.g. newspapers have pointed out the lack of information and technical studies about the service operation and number of bus owners and routes, among others (see Perez-Vega, 2013; Vivar-Galvan, 2012).

Recently, the local authority has published a technical report for discussing the fares of the service (IMTJ, 2013). This document showed a series of anomalies in the bus service, e.g. it was reported that buses fail to comply with safety requirements such as tyres in bad conditions and the lack or no appropriate mirrors, among others. But, perhaps the most relevant finding of this report which supported what was stated by representatives of NGOs, was that even though the local authority knows about the problem, it has not done enough to regulate the service properly. According to the participants from the local authority, the lack of regulation is due to the gaps in the legislation and issues that previous groups in the Government have not concluded. However, representatives from the *Colectivo Ecologista de Jalisco* and *Red Ciudadana* pointed out that this situation has been occurring over the last three or four decades and usually the Government in current office do not address properly the problem.

Another issue raised by several participants was how the legislation has impeded a good regulation of the service. Specifically, participants referred to the fact that for many years the Law of Transport and Mobility did not allow owning more than three buses per each bus operator. This restriction in the law resulted in the creation of the *Hombre-Camion* Model, which has several implications for the service characteristics, some of which will be discussed in 4.5.3 . It should be noted that last year the law was updated (Gobierno de Jalisco, 2013a) and it now forces the establishment of the *Ruta-Empresa* Model, which means that at least each route should be established as a, and controlled by bus company. Regarding this change, some participants stated it will provide several ways for improving the service, however, they said it will take long time for this model to be implemented.

Regarding legislation and regulations related to the inclusion of older and disabled people, the document analysis identified some achievements, but also a number of gaps in the legislation, as well as in its application. In terms of social inclusion, Mexico has three laws which apply at the national level: Law on the Rights of the Elderly (INAPAM, 2011), General Law for the Inclusion of People with Disabilities (Sedesol, 2011)), and the Federal Law to Prevent and Eliminate Discrimination (Gobierno de Mexico, 2007)). These laws are based on the principles of social inclusion, autonomy, and self-realisation for all irrespectively ethnic background, religion, age, or physical abilities. The laws promote the inclusion in health services, housing, public buildings and transport. Concepts such as accessibility, safety, comfort and universal design are

included in the national legislation. However, among the gaps in the legislation, the Law for the Integral Development of the Older Adult of the Jalisco's State – which is the state where Guadalajara city is located – only mentions that older people have the right to live in a free-barrier environment, but it does not specify how or who is responsible for enabling this. Equally, in terms of public transport the Law just points out that the local authority should encourage that priority seats are given for older people using the service. In the same way, the Law of Mobility and Transport (Gobierno de Jalisco, 2013a) and its Technical Standard indicate that buses should be designed with a couple of priority seats for older and disabled people, but there are no more design requirements for making buses more accessible for these group of passengers.

Beyond the gaps in the law, some participants stated that the biggest gap is again in its application. A representative of one NGO suggested that even if there are many laws, it is very difficult observing its application in the public transport system. However, various participants expressed that it is good those subjects are in the law and in the public discourse. They said there has been some progress, such as the priority seats and the design of some buses with special lifts for disabled people.

4.5.3 The *Hombre-Camion* Model - implications on the bus service

As stated above, one of the main characteristics of the *Hombre-Camion* Model is its informal organisation since it is formed by people who possess their own bus and work in co-operation with others. This mode of operation has several implications for bus service quality; those relating to 1) regulation of the system, 2) driver behaviour, and 3) bus design are discussed below.

4.5.3.1 Regulation of the system

According to participants from the local authorities, it is really difficult to regulate a bus system in which there are more than 4000 people participating as bus operators and where each bus is managed as an enterprise and each route is operated based on informal agreements among those owners. A bus operator expressed that due to the lack of strong regulation by the government, each bus operator does what they think is the best or what best suits their interests. This operator stated that there is not a regulation or regulation body which establishes clear criteria of service operation.

Generally, a bus operator seeks to maximise profits, even if that means competing against other members of the same route or not providing the best service for users. In that context, even though there is a series of rules for the operators and bus drivers to follow, it is technically impossible for the local authority to monitor and control all of them. However, it must be noted that several participants - bus operators, drivers and members of NGOs - stated that such an informal system produces and is produced by relationships which are shaped by corruption characteristics.

4.5.3.2 Driver behaviour

Most of the participants commented that without doubt one of the biggest implications of the *Hombre-Camion* Model is on the bus drivers' behaviour and their driving style. Participants explained that since drivers are paid by the number of collected passengers, they compete, race and 'fight' with other bus drivers. A bus operator stated that this is the best mechanism for payment because it helps bus drivers work better. Conversely, the bus drivers who participated in this study expressed that the method by which they are paid increases levels of stress and the probabilities of an accident. These drivers stated they would prefer a fixed amount of salary.

The model also implies that each operator provides different working conditions for its bus driver(s). Nevertheless, overall all drivers work shifts of 13 hours (IMTJ, 2013) without fixed breaks. An issue noted by participants is that drivers receive poor training for doing their job. Additionally, they have many tasks as part of their duty such as cleaning and maintaining the bus. Furthermore, they are sometimes ticketed by the police due to problems related to the bus.

4.5.3.3 Bus design

Finally, this model has implications for bus design since the higher costs of a better designed bus are not affordable by most bus operators in the city. According to the managers and designer of the bus manufacturing company, bus operators always try to buy the cheapest buses. This situation can be explained in part by the fact that many bus operators acquire their buses using a bank loan, which they have to repay between three to eight years, however this is another way of maximising profits i.e. by reducing costs. However, a bus designer gave the opinion that this situation continues because there is no legislation that obligates owners and operators to have better designed buses.

4.5.4 Public perception on the quality of the bus service

Any resident in Guadalajara might say how poor the quality of the bus service is or at least that was the opinion of some participants. Indeed, in the view of many respondents, public transport is not a very attractive option for moving around the city; what is more, most of them stated that they do not use it. This can be explained by the fact that these stakeholders can afford a car and therefore avoid the use of public transport. Only one participant, who was a member of an ecologist NGO, expressed using the bus service as mean of transport.

Accordingly, the document analysis also enabled an understanding of what is known about the bus service. It is recognised that most of the people in the city consider that the quality of the service is deficient (Hernandez, 2013; Perez-Vega, 2013b). But beyond opinions about the quality, three other main themes relating to public transport were observed: 1) safety and number of accidents, 2) drivers' behaviour, and 3) discussion and approval of fares increment.

4.5.4.1 Safety and number of accidents

Although traffic accidents are not exclusive to the bus service, very often it is associated with accidents. Undoubtedly, it seems there are enough reasons for them. According to some official figures, 5, 567 people were involved in an accident relating to public transport between 2007 and 2012, and an average of four people per month died because of those accidents (Informador redaccion, 2012). In the analysis of the news, striking observation was that each casualty is presented in terms of the consecutive number of deaths in the year, e.g., '*Death of victim number 29 related to public transport*'. Even if the newspapers rarely explain the causes of accidents, bus drivers are habitually held as responsible for them (e.g. see Mellado, 2014).

4.5.4.2 Drivers' behaviour and service quality

Bus drivers are also blamed for the poor quality of the service. According to the Local Authority, more than any other element of the bus system, users' complaints are related to the bus drivers (IMTJ, 2013). Furthermore, some participants in this study expressed that the media has helped to create a very negative stereotype of drivers. The most critical participants also stated that public perception does not regularly focus on what happens on the 'backstage' of the service, that is, the role played by people behind the drivers in providing the service. However, all the voices suggested that over the last

years there has been an increasing public demand for improving the bus drivers' performance.

4.5.4.3 Fares discussion

Finally, another subject on the public perception was related to the discussion of the fares. This topic was expressed by some participants, but also much news is produced about it. A NGO representative commented that the people in the city perceive that bus operators only want to increase their benefits and do not care about users and the quality of service. Hence, whenever operators want to increase the cost of fares, many voices are raised against the increment; so the complaints about safety and poor quality of the service fill the newspapers pages.

4.5.5 Trends and commitments for improving the service

A series of factors are now working towards improving the bus service for use by a larger number of people. From the responses of the different participants it was possible to appreciate that there is increasing pressure coming from diverse groups within the city, who have highlighted the severity of problems such as the amount of traffic and its impact on environment. Likewise, other groups have been intensifying the discussion in favour of the inclusion of older and disabled people. Additionally, the accusations of these groups along with the media about the accidents and poor quality of service have impregnated the social atmosphere on the urgent need for service improvements.

It seems that such kind of pressure has led to the implementation of some measurements to improve the service. With respect to local authority, there is currently a series of actions aimed at enhancing mobility in the city including: a change in the mobility law, the modernisation of buses, and the integration of the system (Perez-Vega, 2013a, 2013c). In terms of the law, the main changes include moving from the *Hombre-Camion* Model to the Model *Ruta-Empresa*, and better training for drivers (Gobierno de Jalisco, 2013a). Meanwhile, whilst the modernization includes the replacement of buses, it does not necessarily mean that the new buses will be more accessible, as stated by the representative of *Red Ciudadana*.

Amongst the bus operators there is a concern regarding the number of users who have chosen not to use the bus service anymore. According to the leader of the biggest group of operators, it is noticeable how each day fewer and fewer people are willing to use the service for safety and comfort reasons. Similarly, the representative of the biggest bus

company has stated that if no actions are taken, the current model of bus service might collapse in few years due to inefficiency in its operation (Herrera, 2013). In that context, it appears that the bus operators are also aiming at a service improvement through a change in the way that drivers are paid and trained.

4.5.6 Summary of results

A large volume of data was obtained from this study, from which the results were classified and summarised into a total of five themes, namely: 1) current situation of the mobility in the city; 2) Gaps and weaknesses on the regulation of the system; 3) The implications of the hombre-camion model; 4) perception of the quality of the service; and 5) Trends and commitments for improving the service. Table 4.1 shows a summary of the main results discussed in this chapter that affect the bus service operation and prevent the delivery of an inclusive service.

Table 4.1 Themes and issues identified related to the bus service operation

Themes	Issues Identified
Current situation of the mobility in the city	<p>Guadalajara's mobility options comprise modes of transport which appear not to meet most of the peoples' needs</p> <p>There is a high dependency on the private car. The urban investment in infrastructure has favoured private car use. Conversely, there has been little investment in other mobility options</p> <p>The use of private cars has prevented the development of better public transport options, whilst simultaneously the lack of a good public transport system has incentivised using the car.</p> <p>Over the last decade public transport has lost about half of passengers who have preferred using the private car.</p> <p>The exaggerated use of cars has caused several problems such as traffic congestion, increased travel times, air and noise pollution, and a high rate of accidents in the city.</p> <p>Despite of the lack of quality of public transport, most of the population still uses this mode of transport.</p>
Gaps and weaknesses on the regulation of the bus service	<p>Weak regulation of the bus service, hence it presents diverse irregularities.</p> <p>Lack of information and technical studies about the service operation.</p> <p>The legislation has permitted the rise of the <i>Hombre-Camion</i> Model due to its restriction of a maximum of three buses being owned by any one person.</p> <p>Although there is legislation to promote social inclusion of older and disabled people, there is still a big gap related to its application.</p>
The <i>Hombre-Camion</i> Model, implications for service operation	<p>The bus service is an informal organisation comprising people who own their own bus and who work in co-operation with others. Each bus might therefore be managed differently.</p> <p>It is very difficult to regulate such a fragmented bus system in which there are more than 4000 people participating as bus operators.</p> <p>Bus operators seek to maximise profits, even if that means competing against other providers on the same route or not providing the best service for users.</p> <p>Bus drivers are paid by the number of collected passengers, and so they compete, race and 'fight' with other bus drivers.</p> <p>Drivers work shifts of up to 13 hours without fixed breaks, and do not receive proper training for doing their job.</p> <p>Buses are designed on a truck chassis due to the lower cost. Well-designed buses are too expensive for a single owner.</p>
Public perception of the quality of the service.	<p>Any resident in Guadalajara might say how poor the quality of the bus service is.</p> <p>The bus service is frequently associated with accidents.</p> <p>Bus drivers are habitually pointed out as being responsible for the lack of quality of the service.</p> <p>People perceive that bus operators only want to increase their profits and do not care about users and the quality of service.</p>
Trends and commitments for improving the service	<p>Increasing pressure for the inclusion of older and disabled people</p> <p>The accidents and poor quality of service have impregnated the social atmosphere on the urgent need for service improvements.</p> <p>There is currently a series of actions aimed at enhancing mobility in the city including: a change in the mobility law, the modernisation of buses, and the integration of the system.</p> <p>There is a concern amongst the bus operators related to the number of users who have chosen not use the bus service anymore.</p>

4.6 Conclusions

This study illustrates the wide diversity of data that can be obtained from stakeholder consultations and document review, which will help in understanding the broader elements that negatively impact the bus service system. By extension, this data provides insights into the factors that may be encouraging a modal shift away from public transport to private car use and therefore provides insights for improvements to bus service design and uptake.

Results from this study suggest that it is important that the design of the service considers not only bus users' views (customers/passengers), but those of bus drivers, operators, manufacturers, local authorities, and other relevant stakeholders. For instance, the results indicated the presence of several issues related to drivers' attitude and behaviour, thus supporting findings within the literature review. Drivers are blamed for the poor quality of the service, but the results of this study show that they are 'forced' to work under poor working conditions. Therefore, it is very important to consider the role played by people behind the drivers in providing the service.

Overall the results from this study confirm the compelling necessity for a better bus service in the city. These results indicate that the current service is not characterised as being safe and desirable from the users' perspective, and since fewer and fewer people are willing to use the bus, it is becoming less profitable to service operators. Whilst this study has enabled a good insight into the broader factors affecting the bus service, more research is needed to complement this with data relating to the users' experience and how these experiences are affected by the service components. The following three chapters address this need through the use of a mixed methods approach.

Chapter 5 Identifying and prioritising bus service issues and their impact on younger and older people experience

5.1 Introduction

The previous study (Chapter 4) highlighted, according to stakeholders and documents analysed, several constraints in the bus service provision and some of the reasons why they were occurring. Overall, the findings revealed the presence of a poor public perception of the quality in the bus service, and an urgent need for service improvement. It also transpired that poor quality of the service discourages its use not only for older people but for most users in the city. However, there is a lack of clear understanding as to which service components affect the user experience. Furthermore, for service design it is crucial to understand the situation from the perspective of customers (Stickdorn, 2010c), through the gathering of insights into their experiences, desires, motivations, and needs (Polaine et al., 2013).

This study, along with the studies in Chapter 6 and 7, aimed to gain a clear understanding of current and potential users' experience. Moreover, since the overall aim of this doctoral research is to explore possibilities to design inclusive services through the integration of Service Design and Inclusive Design approaches, this study applied a holistic approach in investigating the service (Service Design), from the perspective of younger and older people (Inclusive Design). Additionally, the study was guided by the human factors criteria of safety, usability, and comfort. The study in this chapter applied the focus group method to investigate the problematic issues of the use of the bus service and their impact on younger and older people's experience.

5.2 Aim and objectives

The overall aim of this study was to identify the problematic issues of the bus service that impose greater difficulty in using the service and its impact on younger and older people experience. The specific study objectives were to:

- Identify which elements of the transport system impose greater difficulty in the use of the bus service.
- Investigate whether or not younger and older people prioritise differently difficulties in the use of the service.
- Determine if older people report different impacts in terms of safety, usability, and comfort to those reported by younger people.
- Understand (infer) needs of younger and older people using public transport.
- Prioritise areas of intervention according to the issues that impose greatest difficulties according to the age of the user,
- Discuss if, given the demands imposed by the bus service and the reduced capabilities due to ageing, the gap between what users need and want and what service provider offers is wider for older people.

5.3 Study rationale

The main purpose of this study was to ascertain the problematic issues of the bus service that impose greater difficulty in using the bus service and their impact on users' experience. In order to get this information, the focus of this study was concentrated on users. It employed a data collection method that was able to obtain some initial insights into younger and older people's experiences, desires, motivations, and needs.

Focus group is an appropriate technique for data collection that enables to gain an insight into the research topic and the needs of a specific group of people, and it is a useful tool to obtain information regarding how people think and feel about some matter (Barrett & Kirk, 2000). A traditional focus group is a method highly efficient for qualitative data collection since it facilitates interviewing many people in little time and encourages participation from people who do not want to participate or who think that they do not have anything to say about the topic (Robson, 2011). However, the structured focus group version used for this study was specially designed to: a) prioritise the issues of public transport that impose greater difficulty to passengers, and b) to the promotion of an equal participation for all group members.

Since the aim was to understand and prioritise problematic issues of the bus service and its impact from the users' perspective, a version of structured focus group was used. Traditional focus groups have been used to explore and identify issues of older people using the bus service (Broome et al., 2009). However, the strategy used in this study is a structured focus group version, which aimed not at just identifying the problematic issues, but rather prioritising them.

5.4 Method

5.4.1 Overview

The study used a structured version of the focus group method to understand and prioritise issues that impose greatest difficulties in the use of the bus service to younger and older passengers. Discussions were aimed at eliciting the impact of those issues for each of the age groups. Data were transcribed in full and thematically analysed using NVivo 9 (QSR International, 2010). The study also included the application of a questionnaire to gather the participants' demographics data and their travel habits. The results are interpreted in terms of how problematic issues in the use of the bus service have different impact in terms of safety, usability, and comfort according to the capabilities of the passengers' age groups.

5.4.2 Participants

The study recruited a sample of younger and older participants, via a general call in the Metropolitan Centre of the Elderly (CEMAM, according to its designation in Spanish), twenty-six older people were selected based on being aged 60 or over and with appropriate language and cognitive abilities to participate in the group discussions and give informed consent. To encourage greater breadth in the data, a combination of frequent and infrequent travellers took part in the study. A total of four focus groups with older participants were conducted and the composition of each as follows:

- *Focus group 1:* Five women and two men aged between 64 and 75: three of whom lived alone, three with their partner, and one with partner and children. Three of them reported problems in going out and about, particularly in relation to knee pain and dizziness. All of them were frequent users of the bus service.
- *Focus group 2:* Six women aged between 60 and 77; one lived alone, three with their partner, and two with partner and children. Four of them reported problems

in going out and about, particularly in relation to knee, ankle, leg, and spine pains. One more reported being disabled. All of them were frequent users of the bus service.

- *Focus group 3:* Five women and two men aged between 62 and 76; only one of them lived alone, and the rest were living with partner and children. One participant reported problems in going out and about due to hip problems. All of them were frequent users of the bus service.
- *Focus group 4:* Five men and one woman aged between 64 and 75; three of whom lived with their partner, and three with partner and children. Three of them reported problems in going out and about, particularly in relation to knee pain. One participant had prosthesis after a knee surgery, and another had an amputated leg. All of them were infrequent users of the bus service.

A similar strategy was used to recruit 17 students from the first year at the University of Guadalajara. These younger participants were aged between 18 and 21 years, and they all were frequent users of the bus service. Appropriate language and cognitive abilities to participate in the group discussions and give informed consent were also required of these participants. The groups' composition was the following:

- *Focus group 5:* Four women and two men aged between 19 and 20; all of whom lived with their parents. Only one participant reported problems in going out and about due to a temporal disability caused by a minor accident in one of her legs.
- *Focus group 6:* Two women and three men aged between 20 and 21; all of whom lived with their parents. There were no reports of problems going out and about.
- *Focus group 7:* Six women and one man aged between 18 and 21, all of whom lived with their parents. There were no reports of problems going out and about.

5.4.3 Materials

To support the participants in the discussion and to prioritise the issues that impose greatest difficulties, a set of cards with main issues about the bus service were used. The subjects included in the cards were based on an initial literature review, and an analysis of the components of the bus system. With respect to keeping the big picture in mind (Stickdorn, 2010c), eight general elements of the service were included, which comprised components of a door-to-door journey. These elements were written in the

cards and some prompts were used for a better understanding of the headings. Table 5.1 shows the subjects used as headings in the cards. Participants were asked to order the cards according to the level of difficulty and subsequent discussion was focused on the way of the cards were prioritised. Each participant offered a verbal explanation of the reasons for their sequence, allowing the same opportunity for all the participants to contribute their answers.

Table 5.1 Subjects and prompts used in the cards

Subjects	Prompts
Information	<ul style="list-style-type: none"> • Routes • Bus stops • Maps • Timetables
Distances to walk	<ul style="list-style-type: none"> • Distances to the bus stop • Pavement conditions • Crossing roads • Distances to the destination
Drivers	<ul style="list-style-type: none"> • Driving style • <i>Transvales</i> (boarding tickets) • Kindness • Time to get on and off
Bus design	<ul style="list-style-type: none"> • Steps • Doors • Seats • Corridors • Handrails • Bell's position • Route number
Payment method	<ul style="list-style-type: none"> • Fares • Getting and using <i>transvales</i> (travel concession)
Bus capacity	<ul style="list-style-type: none"> • Number of seats • Number of passengers • Priority seats
Waiting and traveling time	<ul style="list-style-type: none"> • Bus stops • Waiting time • Travel time
Routes	<ul style="list-style-type: none"> • Number of routes • Routes and destinations

An extra card with “other” was included, in case of any participant wanted to add another issue. In order to control each participant’s cards, the sets of cards were

differentiated through the inclusion of the pack number of the back and by use of colours (see Figure 5.1).



Figure 5.1 Participants using the cards

5.4.4 Questionnaire

A questionnaire was developed to record the participants' data in relation to their demographics and their travel habits using public transport (see Appendix A). Given these were convenience samples, collecting these data enabled an understanding of the breadth of characteristics of the participants sampled.

5.4.5 Ethics

For any research involving human participants, an ethical checklist needs to be first completed (See Appendix B). This acts as screening mechanism to identify those studies which merit additional ethical support. Since this study included older people who were classed as a vulnerable population group, additional ethical controls were required. These were implemented by adding the study to the generic protocol number G04/P4 - Focus groups, Interview and Questionnaires with Vulnerable Groups (See Appendix C). This generic protocol states that:

- Particular care should be taken to ensure that 'vulnerable' participants understand the form and scope of the research,

- The researchers will be instructed to ensure that at least one other person is present in the room,
- The risk of injury should be minimal, and
- Participants should only participate in activities that they are comfortable with.

In order to facilitate better conditions to older participants in the study, some especial arrangements were implemented in the focus groups. According to Barrett & Kirk (2000) special care is needed to run this technique with older participants, and therefore a series of recommendations were followed during the process of application, e.g. in order to improve legibility and reduce working memory demands for the older participants (Barrett & Kirk, 2000; Fisk, Rogers, Charness, Czaja, & Sharit, 2009), the subjects and prompts in the cards were written in large type size, 18-16pt respectively; the use of only capital letters in the text was avoided, and simple language was used. Additionally, prompts and headings were written carefully to avoid negative ideas about those issues.

In addition, informed consent and participant information sheets were developed and used in the study (see Appendices D and E). These instruments were translated into Spanish language to be used with participants in Mexico.

5.4.6 Pilot

In order to assess the focus group procedure and to become practised in it, a pilot test was carried out with people who were assistants in this study. The pilot was useful to train the assistants and also to refine instructions and find out how much time was needed in each stage of the process, as well as to review the prompts in the cards. The pilot also helped to determine that at least three assistants needed to support the focus groups with older people and only one assistant was needed in the groups of younger people. It was also decided to set a break after the first 40 or 45 minutes of each session with both younger and older participants.

5.4.7 Procedure

5.4.7.1 Recruitment

An invitation to participate in a focus group was given to older people who were attending the CEMAM. The initial invitation was made as a general call through the staff of the day centre. Those people who expressed an interest in taking part in the

study were then informed by the researcher about the objectives and procedure of the study; for each participant was explained what was expected of them and how data would be obtained. Once it was confirmed they met eligibility requirements and had accepted the invitation, an appointment was arranged regarding the date, time and place to undertake each focus group. The process to recruit younger people was similar; the only difference was location related to in the University Centre of Art, Architecture and Design of the University of Guadalajara.

5.4.7.2 Running the focus groups

All the group discussions with older people were undertaken at the CEMAM building, which was a familiar and well-known location for all the participants, and which was designed to meet needs of older people. In addition, a well illuminated and air ventilated room was used for the discussions. The room was located in a quiet area to avoid being disturbed by the usual noise of the day centre. Barrett & Kirk (2000) suggest that a good environment is needed to apply the focus group technique with older people. The focus groups with younger people were held at the Art, Architecture, and Design Centre of the University of Guadalajara, which meets similar conditions to the place where the older people's discussions were held.

Even though the location was familiar to the participants, they were greeted at the entrance of the room by the main researcher or one of the assistants. Once inside, the participants were asked how they liked to be called and a label with their chosen name was developed and given to them to be used as a means of identification during the session. Researcher and assistants were also using one. This is especially useful for older participants because it helps them to avoid the burden of remembering names (Barrett & Kirk, 2000).

Although all the participants had been previously informed about the objectives and procedure, before the start of the focus group a copy of the participant information was given to each participant. The main researcher or one assistant read aloud the information sheet and then participants were allowed to ask more questions about it. Following this, the informed consent was read and given to be signed by each participant. The participants were then asked to complete the questionnaire with assistance being provided if needed. Once all forms were read and completed, the focus group discussion started.

To begin with, each card with the public transport issues was presented and carefully explained. After that a set of colour cards was given to each participant and they were asked to follow this instruction “*please, review each issue in the cards and rank them, considering first those that impose greater difficulty using the bus service*”. Once participants had ordered the cards, a number between 1 and 9 was assigned to the cards to record ranking. Figure 5.2 shows the older people while they are ranking the cards.



Figure 5.2 Older people ranking the cards

In the next stage, each participant had the opportunity to contribute his/her reasons for their given sequence and explain the reasons for the first three cards in the list.

Participants used that time to talk about perceived problems they encountered and the impact of these on their use of the service. Although participants had a turn to speak, they were also allowed to speak freely when they wanted to add anything else or when they did not agree with other participants. These discussions were recorded using a Sony audio recorder, with their permission.

A short break was held and refreshments were offered to the participants. After that, participants were invited to propose some solutions for improving the bus service. For this purpose a blank card in the same colour was provided to participants; afterwards some of these solutions were identified for further discussion by the participants. Finally, the researcher and assistants thanked and said goodbye to all the participants.

5.4.8 4 Issues running focus groups

There were some issues related with the way that focus groups were undertaken, most of them were associated with participant age. For instance, the majority of older people

needed help to complete the questionnaire and they also requested more explanation about the aims of the study and the process of the cards prioritizing. Discussions were richer in focus groups with older than younger people. Consequently, time in the older people groups (about 2.5 hours) was longer than in younger people groups (about 1.5 hours). Even though it was expected that duration of the discussion was two hours, older people were interested in talking more about their experience in using the bus service.

5.4.9 Analysis

The results from this study comprised different data sets which required different methods of analysis. First, a descriptive analysis was used to the demographics data and travel habits gathered by the questionnaire. Microsoft Excel was used to perform calculations and obtain the ranking to the public transport issues.

The second part of the data analysis involved dealing with the audio recordings from the groups discussion. These files were imported into the QSR International NVivo software, and a thematic analysis was undertaken to the exploration of this qualitative data. Based on the concepts of the elements of the bus service, and the concepts of usability, safety and comfort, a theoretical driven thematic analysis was used (Braun & Clarke, 2006; Robson, 2011). The analysis was undertaken at a semantic and realistic level (Braun & Clarke, 2006), i.e. themes, subthemes and codes were identified within the explicit meaning of the data. Initial themes were based around (1) the problematic issues and (2) their impact on the passenger. These were derived initially from the theoretical perspectives, and then developed based on participant discussion.

The analysis was undertaken following the procedure describe by Robson (2011). Firstly -and after the full transcription-, the data were read carefully in order to identify initial ideas. Secondly, extracts of text related to similar issues were selected to create the first analytical categories, which later would create the subthemes and later the themes. An extract from the text could be in more than one category.

As the next step, two themes were defined from the importance of the data in relation to the research question, and they represent some level of patterned response or meaning within the analysed data (Braun & Clarke, 2006). Although the first theme (called ‘problematic issues’) and its nine subthemes emerged, initially, from the list of issues of the bus service that were presented by the researcher and prioritised by participants in

the focus group discussions, different issues arose after the first coding. The second theme and its four subthemes emerged from analysing people's comments related to how those problematic issues have an impact on their experiences. This theme is called 'impact on users' experiences'.

Once the themes, subthemes and codes were defined, the extracts were, carefully and systematically, reviewed to ensure that all of them were located in the correct code and subtheme. The fourth step included building thematic maps to allow a better understanding on how the subthemes relate together, and to observe differences between younger and older participants (as shown in Figure 5.3 and Figure 5.4).

Finally, a description and discussion of the relation between codes and subthemes was made. Since this study aims to get a better understanding of the whole picture of the bus service use, and there was no previous research and knowledge related to the use of the bus service in the studied context, it was aimed to produce a rich description of the data rather than a detailed account of a particular aspect.

5.5 Results and discussion

For the sake of clarity, this section combines the results and discussion into one. Firstly, demographic data of the participants and their travel habits using public transport are presented, followed by a ranking of identified problematic issues. Following that, there is a description and discussion of the results of the thematic analysis.

5.5.1 Demographics and travel habits

A total of 43 participants took part in this study. There were 26 (60.5%) older participants in four focus groups and 17 (39.5%) younger participants in three groups. The majority were female (65.2%) and frequent passengers (83.8%). Eleven (42.3%) older participants reported having problems going out and about; in contrast to only one younger participant who had a temporal physical impairment. Table 5.2 shows the characteristics of the study's participants.

Table 5.2 Characteristics of the participants (n=43)

		Younger participants n=17	Older participants n=26
Age	Mean (min-max)	19.7 (19/21)	69.7 (60/77)
Gender	Male	35%	35%
	Female	65%	65%
Living situation	Alone	0	15%
	With partner	0	39%
	With partner and children	0	38%
	With parents	94%	0
	Other	6%	8%
Physical problems limiting mobility	Yes	6%	43%
	No	94%	57%
Employment status	Employee	0	4%
	Retired	0	50%
	Self-employed	0	12%
	Student	100%	0
	Other	0	34%
Main source of income	Employment	0	4%
	Pension	0	50%
	Own business	0	8%
	Financial help from relatives	82%	34%
	Other	18%	4%
Monthly income (Mexican pesos)	Less than \$3,500.00	94%	81%
	\$3,501.00 and \$7000.00	6%	15%
	\$7001.00 and \$ 10,500.00	0	0
	More than \$10,500.00	0	4%

A general overview of the participants' travel habits using the public transport system is shown in Table 5.3. The most common reasons for travel for older people were to access medical services (62.9%), to go shopping (55.5%), and to visit friends or relatives (44.4%). Whereas, main reason for travel for younger people were to go to school (100%), to visit friends or relatives (94.1%), and to go shopping (52.9%). For both groups of participants the bus was the most common mode of transport, with exception of a) those older participants who were not frequent passengers and travelled by taxi or their own car, and b) all the younger participants who used the Bus Rapid Transit system to attend school. It is apparent from this table that younger people use the bus service more frequently than older people, and that older people tend to use the bus service in the mornings.

Table 5.3 Bus travel habits of the participants

Reason for using bus service	Younger (n=17)			Older (n=26)		
	%	Average Frequency	Time of the day	%	Average Frequency	Time of the day
Visit friends or family	94%	Fortnightly	Afternoon	44%	Monthly	Morning
Medical services	17%	Monthly	Afternoon	62%	Monthly	Morning
Shopping	52%	Weekly	Evening	55%	Weekly	afternoon
Banking	0	----	----	22%	Fortnightly	afternoon
Attending clubs or associations	23%	Fortnightly	Evening	19%	2 or 3 times per week	Morning
Work	17%	Daily	Afternoon	14%	2 or 3 times per week	Morning
School	100%	Daily	Morning	3%	Daily	Morning

5.5.2 Ranking of problematic issues

An objective of this study was to investigate whether or not younger and older people prioritise those aspects of the bus system which impose greatest difficulty to its use in different ways. This section presents the results and discussion regarding how the participants ranked those issues. Table 5.4 shows the ranked position for these issues as given by younger and older people and the aggregated values that each group of participants assigned to each issue. It is important to note that this ranking is the result of the first activity which was undertaken in the focus groups which occurred prior to any discussion.

Table 5.4 Ranking of bus service problematic issues by the group of users

Rank	Younger people n = 17	Aggregated values	Older people n = 26	Aggregated values
1	Drivers	55	Drivers	79
2	Bus capacity	64	Bus design	93
3	Waiting and traveling time	80	Bus capacity	98
4	Bus design	81	Distances to walk	119
5	Information	85	Waiting and traveling time	137
6	Payment	107	Information	159
7	Routes	109	Payment	169
8	Distances to walk	126	Routes	178
9	Other	153	Other	234

Drivers, bus capacity (crowded buses), bus design, and waiting and traveling time were ranked in the first five places when the rankings from both groups of participants were

combined. The prioritisation of younger and older participants showed some differences, for example the older participants prioritised bus design in second place while the younger participants assigned it fourth place. Distances to walk was ranked in the fourth place by the older participants in comparison with almost the last place assigned by the younger group. Another difference amongst the two groups was waiting and traveling time, which was ranked higher by the younger participants. However similar positions were assigned by both groups for issues relating to drivers and bus capacity (crowded buses).

Given declining functionality due to the ageing process (e.g. motor, visual, auditory, cognitive, or health limitations), the gap between personal abilities and environmental demands becomes wider, hence older people encounter increasing difficulties in undertaking their daily activities, among them using transport services (Rogers et al., 1998; Seidel et al., 2009). Although, in this study younger and older participants shared similar experiences in relation to some aspects of the bus service e.g. drivers and bus capacity, older and younger participants each expressed their own unique reasons regarding why each issue was considered at that position.

The differences in the rankings and the reasons reported by participants in this study are consistent with the study results of Broome et al. (2010), who found that younger and older Australians bus users also reported similarities and differences in prioritising barriers to the use of the bus service. However, the prioritisation of the problematic issues in the current study was different to the top ten barriers that Broome et al. (2010) reported. For instance, in their study unfriendly drivers were placed in the sixth place by older participants, and younger participants did not include drivers as a barrier at all; while in this study drivers were ranked highest by both groups of participants. Data from the study in Chapter 4 might help to explain this difference since it implied that poor drivers' working conditions might affect the way that they perform their role as frontline staff.

Another significant difference between the studies is that bus capacity (crowded buses) is not reported as a barrier by Broome et al. (2010), whereas participants in this study assigned a high position for this issue. This difference might be explained by the fact that crowded buses are more often a feature observed in developing countries (WHO, 2007), and so this may not be the case for the cities reported in that study.

5.5.3 Thematic analysis of problematic issues of the bus service and its impact on passengers' experience

In addition to identifying and prioritising the bus system components that impose greatest difficulty in using the service, this study also aimed to identify both the problematic issues, and their impact on the users' experience with consideration to both younger and older age groups. In this section, some figures are used to show graphically the results of that analysis, and later those results are described and discussed in terms of how problematic issues of the bus service have different impacts according to the age group.

Based on the thematic analysis (as described in Section 5.4.9 Figure 5.3 shows themes and subthemes used in the data analysis. Those subthemes with the highest number of participant complaints are located higher within the figure. For example, since more participants expressed issues with drivers than bus capacity, the subtheme drivers has a higher position in the figure. The numbers in parentheses reflect the number of younger and older participants respectively who were affected by each transport issue or impact concept. For instance 'safety (11/26)' means that 11 younger and 26 older participants made a statement relating to this subtheme. The arrows show relationships between an issue and the affected area of the user's experience.

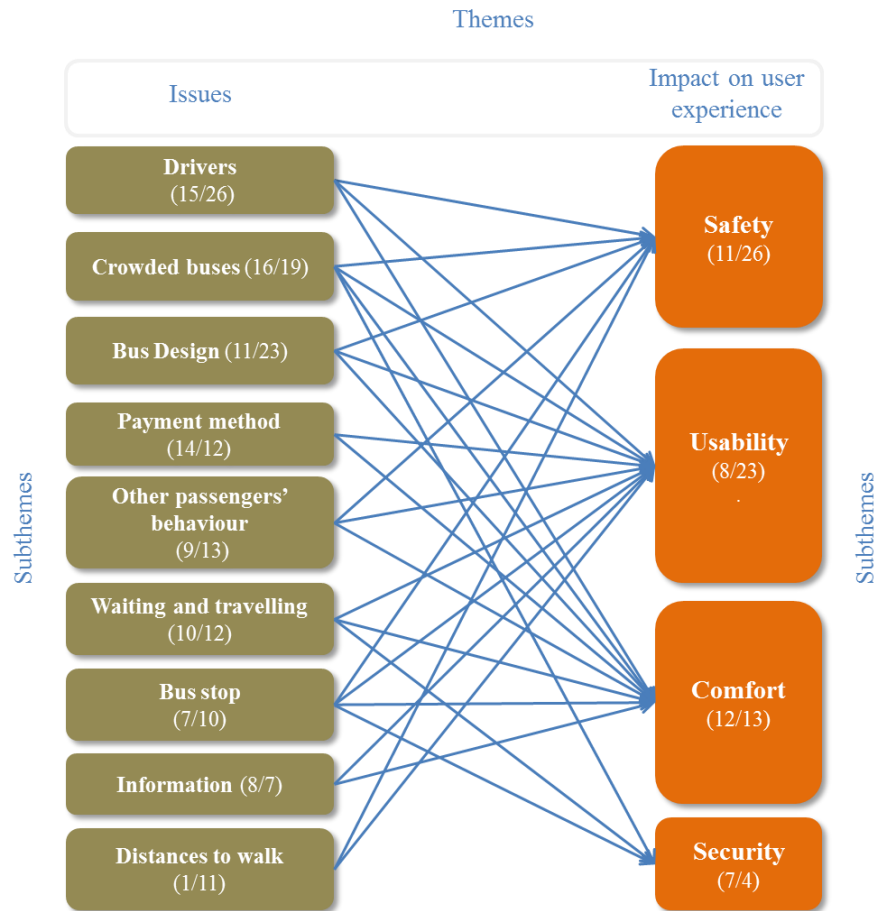


Figure 5.3 Bus problematic issues and their impacts on participants' experience (Younger people, n=17; older people, n=26)

This figure is quite revealing in several ways. Firstly, it illustrates the considerable number of elements (subthemes) of the bus system that are involved in the service and that were mentioned as causes of problems by the participants. Secondly, based on the participants' opinions, the association of each problematic issue (subthemes) and its impact on safety and security, usability, and comfort is depicted. Thirdly, from the figure it is possible to visualise how each problematic issue can cause multiple impacts on the users' experience (e.g. driver behaviour could cause an impact on the safety, usability and comfort a participant perceives); or conversely, each of these areas could be affected by various elements of the system (e.g. a lack of comfort could be caused by crowded buses, bus design and other peoples' behaviour, amongst others). All these elements of the bus system and how they affect the user's experience will be presented and discussed in Sections 5.5.4 to 5.5.7 .

Further analysis was undertaken to investigate the role of age in the relationship between problematic issues and their impacts on the users' experience. Figure 5.4

illustrates the linkages between the subthemes relating to problematic issues and the subthemes relating to the impact on the users' experience for each age group. Those subthemes with the highest number of participant complaints are again located higher within the figure. It can be observed that there are some variations with the prioritisation that was presented and discussed in the earlier section relating to the ranking of transport issues. However, the earlier data was individual data, while the data relating to this figure emerged from discussions, which might have changed peoples' views. Additionally, 'bus stops' and 'other people's behaviour' emerged from the discussions as new categories of analysis. There are also some differences between the previous rankings and to what extent people were talking about a subtheme

The figure shows the priority list of the impacts on the user's experience based on the extent to which younger and older people referred to each subtheme (e.g. 65% of younger people expressed some concerns regarding to safety). In general, drivers, crowded buses and bus design were the main topics in the groups' discussion, but in addition younger participants focused on the payment method, whilst older people gave relevance to other people's behaviour. The most striking finding to emerge from the comparison among the groups of participants was that the older participants expressed more concerns and greater impact on the safety subtheme (100%), followed by usability (89%), comfort (50%), and security in the last position (15%). In comparison, the younger participants stated comfort as the greatest impact (71%), followed by safety (65%), usability (47%), and security (41%).

The figure also illustrates differences in how the problematic issues affect the reported experiences of the younger and older participants. Different width and colour lines have been used to highlight differences in the level of impact reported. The dark, thick, blue lines show where more than 30% of participants stated that those issues had an impact on their experience. Therefore, for the young participants, it can be observed that the problematic issues of bus capacity, drivers, payment method, bus design and other peoples' behaviour have a greater impact on the users' experience in terms of comfort. Additionally drivers' behaviour has a stronger impact on safety, and bus capacity on security. It is also evident that no elements of the bus system were identified as having an impact on usability by more than 30% of participants in this group. In contrast, considering the responses of the older participants, problematic issues of drivers' behaviour, bus design, crowded buses, and older people's behaviour were reported to

have a greater impact on users' experience in terms of safety and usability; with distances to walk also indicated as an element that has a strong impact on safety. Conversely, with respect to the younger participants, no element of the bus system was identified as having an impact on comfort by more than 30% of the participants in this group. Sections 5.5.4 to 5.5.7 describe more deeply the manner in which the users' experience (safety, usability, comfort and security) is affected by each element of the bus system.

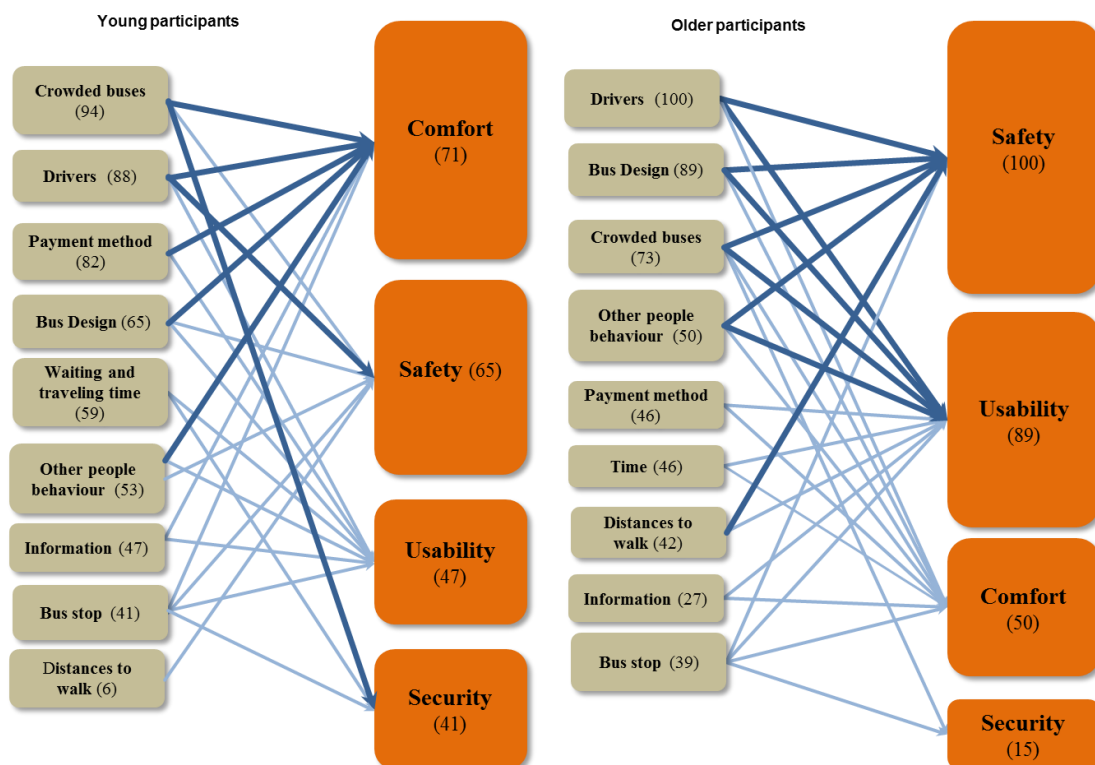


Figure 5.4 Differences on problematic issues and their impact on users' experience by younger and older participants

In summary, these results suggest that not only there are differences in how problems in the use of the bus service are prioritised by the younger and older participants, but that there are differences also in how these problems impact on the users' experience e.g. the problems reported by the older participants have a greater impact on their experiences of safety and usability whereas for the young participants their reported problems have a greater impact on their experience of comfort. These differences among the younger and older participants suggest that these groups may have different needs. Maslow's hierarchy of needs (Maslow, 1987), states that basic and elemental needs such as biological and psychological or safety and security considerations are presented as more fundamental to the individual than others like ego and esteem, or

self-actualisation. The premise of Maslow's Model is that when the needs at the lower levels have been satisfied, then individuals seek to satisfy the higher level needs. Based on this model, authors as Jordan (2000) and Bonapace (2002) have developed similar models to understand users' needs in relation to products. Particularly useful for this study is Bonapace's Model, which is a four-level model with 'safety and well-being' at the lowest level, followed by functionality, usability, and pleasure at the top.

Using this model to analyse and interpret the current results, it can be suggested that the older participants did not express many concerns regarding the impact on their comfort (which could be considered as 'pleasure' in the Bonapace's Model) because they were mainly concerned by the impacts on their own safety (safety and well-being), and by difficulties in using the service (usability). Older people, unlike younger people, experience a decrease in their functional capabilities (Rogers et al., 1998; Seidel et al., 2009), therefore, they encounter more difficulties and their needs are different in using the bus service. Given that generally younger people do not experience such decreased functionality, then their needs in using the bus service are different e.g. elements relating to safety and usability may be less problematic for them and hence they expect to solve needs of comfort (pleasure).

So far, the results suggest that the design of the bus service should consider that these groups of users have different needs. More attention is required on issues that affect safety since this had a large impact on both age groups. However additionally, consideration should also be given to the usability issues experienced by older users. Obviously, it is also very important to consider those issues that produce discomfort to the users, older and younger. This is consistent with the observation by Goddard & Nicolle (2012:182) that to reach a good design in the eyes of older users, designers should 'continue to focus on the basics of accessibility and usability of mainstream products for older users, but designs should of course aim to excel in both function and desirability'.

5.5.4 Impact of the problematic issues on actual and perceived safety

The area of safety is concerned with the predictable or accidental consequences of using a product, e.g. health risks; and safety requirements apply to the intended user group of the product (Wegge & Zimmermann, 2007). In public transport, safety is one

of the expected attributes in a good service (Balcombe et al., 2004; Molinero & Sanchez, 2005; Redman et al., 2013).

A basic assumption underlying this study was that participants, especially older people, would report that the bus service contains some elements which they consider could have an impact on their safety. In the analysis of the focus group discussions it was found that 37 out of the 43 participants recorded some concerns regarding to safety, among them 26 (100%) older people and, interestingly, 11 (65%) younger people. Nevertheless, comments regarding safety were more recurrent in the groups' discussions with older people. Figure 5.5 shows the number of comments registered by younger and older participants concerning safety.

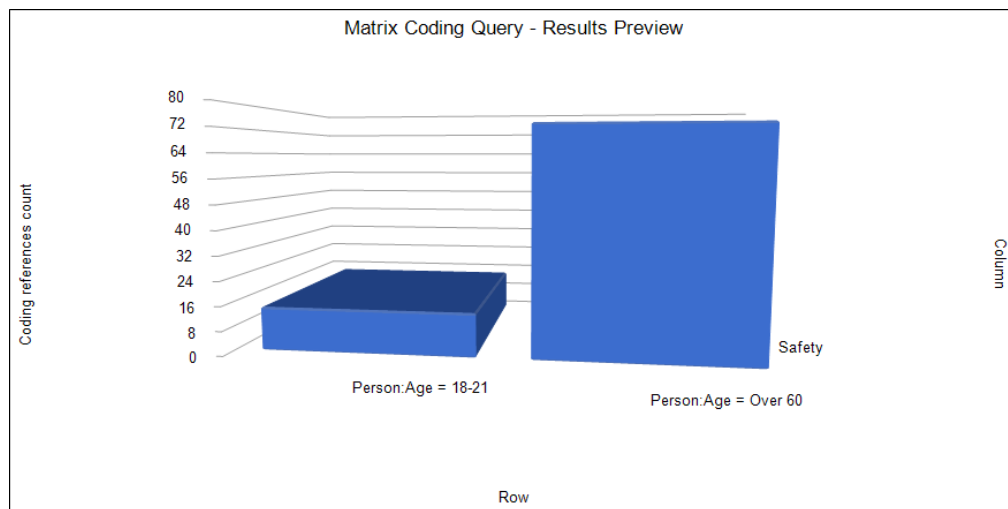


Figure 5.5 Number of comments regarding to safety concerns by age group.

‘Perception of being at risk while using the bus service’ was the main way in which participants expressed comments related to safety. For example, an older participant mentioned that

“It’s not fear, but I am sure that they (drivers) can hurt me. So, it’s not fear, it’s the certainty that something can happen to me, because we can see that there are some risks for older people as me, and even for younger people” (g4-3)¹.

Additional concerns raised in relation to safety expressed by older participants were ‘fear of falling’; and, a fear of using the back door to get off the bus because the driver

¹ For confidentiality reasons participants are mentioned according to the focus group number, followed by a sequential number assigned randomly. Thus, g4-3 means focus group 4, participant number 3.

cannot see them. Feelings of being at risk when getting on and off the bus under a time pressure were also raised by a few younger, and by most of the older participants.

These results suggest that most of the passengers, younger and older, had concerns about being unsafe when using the bus service. However, there were higher levels of concern by older participants, which can be explained by understanding that older people are more vulnerable to accidents, and that a given accident causes more injury to an aged individual, from which it takes them longer to recover (Mitchell & Suen, 1998). Accordingly, the perception of risk regarding personal safety and fear of falling has been revealed by previous research on ageing and transport. For example, Coughlin (2001) found that older people were concerned about being ‘jostled’ on the bus by others or by a driver’s rapid acceleration. Peel et al. (2002) report that fear of falling, and ‘nerves’ affected confident use of public transport by some older people.

Moreover, there is a considerable amount of literature describing older peoples’ concerns for personal safety while using public transport (Broome et al., 2009; Coughlin, 2001; Nickpour et al., 2012; Peel et al., 2002; WHO, 2007). But, it seems that the focus is more related to the perception of crime, and less about accidents. Accordingly Molinero & Sanchez (2005) mention that users’ safety in terms of accidents is important, but that the user seems to give more relevance to criminal incidents. Nevertheless, findings from the current study do not support that idea since the participants (younger and older) reported more concerns regarding their personal safety (accidents) rather than concerns about security (crime). Figure 5.6 shows the difference in the number of comments about safety and security by each group of participants. It can be observed that the trend of being more concerned for personal safety than personal security was very evident amongst the older participants. Concerns about security are presented and discussed in Section 5.5.7 .

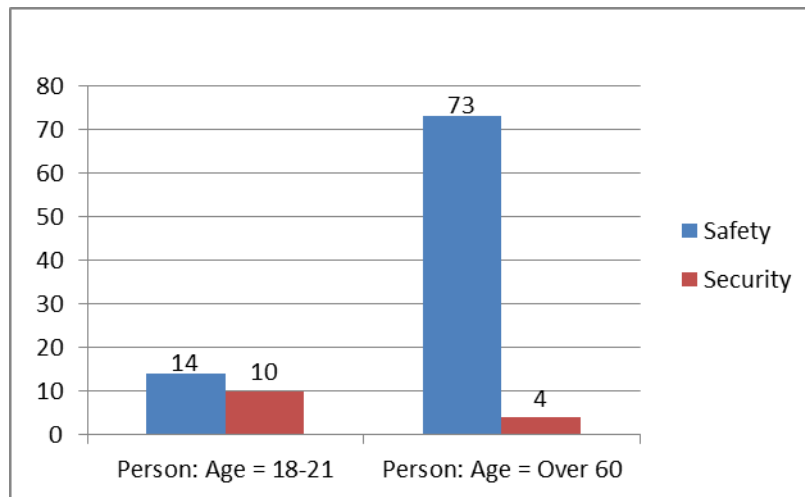


Figure 5.6 Number of comments regarding to safety and security concerns by age group.

Furthermore, the results from this study indicate that the impact on safety was beyond perceptions, concerns or feelings, since 12 out of the 43 participants (1 younger [8.35] and 11 [42%] older) reported having had at least one accident while using the bus service. The level of reported injury was different in each case, varying from those who had had a fall without major outcomes to those who had suffered an accident with permanent consequences. For example, one older participant expressed

“It was two months ago. I was using my stick and dropped it. I gripped the handrail but I could not hold myself up and I fell to the floor of the bus. Fortunately, it did not hurt me!” (g1-7).

In contrast, another older participant illustrated that

“When I hurt my hip, I was sitting in the back, the bus went through a speed bump, but did so quickly, and I jumped within the seat and fell, I hurt my hip That was three years ago and to this day I still have problems” (g2-5).

Similarly, other older participants reported injuries to their neck, shoulders, wrists or legs due to accidents they experienced when using the service. The younger participant who reported an accident did not suffer any serious injury. This difference suggests that using the bus service in the current conditions potentially poses a greater risk to older adults. This is consistent with previous literature that have noted that older people have higher than average accident rates as pedestrians, as public transport users, and, per mile driven, as car drivers (Mitchell & Suen, 1998).

Regarding older people, the literature points out that travel by public transport is much safer than travel by car or on foot (Kirk et al., 2003; Mitchell & Suen, 1998). Perhaps for that reason research on safety and older people has tended to focus on older drivers and pedestrians (see, e.g., Eby & Molnar, 2009; Jancey et al., 2012; Transportation Research Board, 2004), rather than public transport users. However, the safety of older people on public transport is an area which may grow in importance in the near future, since due to the ageing population and the push to the accessible transport, a greater number of older passengers might be expected in the future.

The findings presented so far clearly show a link between safety and bus service use by older people. These findings are consistent with the limited literature that deals with injuries in non-collision incidents while using the public transport (see, e.g., Halpern, Siebzeiner, Aladgem, Sorkine, & Bechar, 2005; Kirk, Grant, & Bird, 2003; Mitchell & Suen, 1998). Research in this area indicates that most of the injuries to bus passengers result from falls when a) the passengers are getting on and off the bus, b) when older passengers need to stand while the bus is in motion, or c) when passengers hurry to board, pay the fare and find a seat. These falls are mainly attributed to sudden deceleration or acceleration activities by the driver.

According to the participants in this study, their safety was mostly affected by bus service issues such as the drivers' driving style, crowded buses, bus design, bus stop conditions, distances to walk, and other peoples' behaviour. The reasons regarding how these issues have an impact on safety are presented below. However, it is important to highlight that the impact on safety is not produced by isolated issues, but in most cases passenger safety is affected by a combination of them. For instance, this situation may be evident when considering the design of the bus with the driving style. This notion of a combination of factors affecting personal safety is consistent with the observation by Kirk et al. (2003). Figure 5.7 graphically shows this relationship and helps to track the content of the following sections.

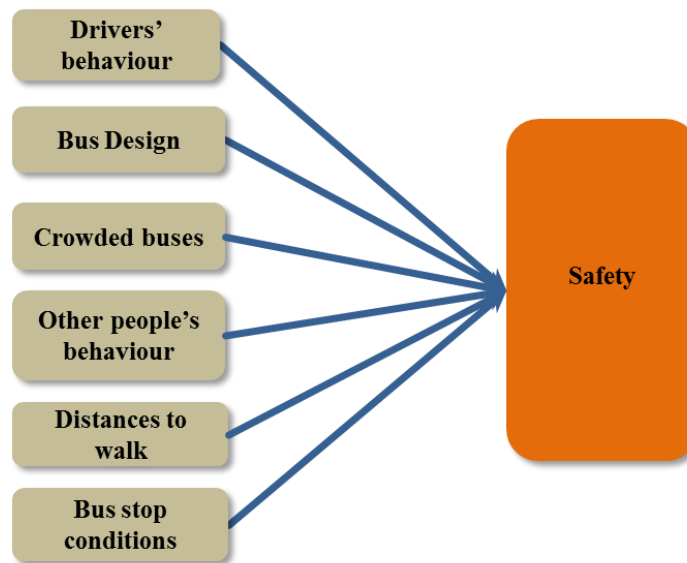


Figure 5.7 Bus service issues with major impact on safety

5.5.4.1 Impact of driver behaviours on safety

The participants reported driver behaviour as one of the main factors that have an impact on their safety. Although, it is important to point out that some participants reported that a few drivers exhibit a good behaviour or driving style, these kinds of drivers are not the majority. This finding is in agreement with that of Kirk et al. (2003), who reported that one bus operator said that 90% of complaints from injured bus passengers put the blame on the driver.

A range of problems were reported, ranging from the driving style to the personal attitudes of some drivers. The driver's driving style was raised as an issue relating to safety by the majority of participants in this study. It was reported that drivers drive too fast and with a very unstable style, either because the drivers have to meet their journey schedule or because they compete with other drivers to have more passengers on the bus. Participant g3-02 illustrated this situation

'They drive as mad people, they are wild or do not know how to drive. They brake, turn around and accelerate brusquely. It seems that we are in a blender! I often get off the bus with pain in my neck, wrists or back'

Other participants supported this opinion and added that some drivers show a lack of caution when driving over a speed bump or potholes in the roads.

The lack of consideration towards the passengers' safety was reported by most of the participants in the study. For example, pressurising the passengers to board or

leave the bus quickly was a common practice by some drivers, as illustrated by an older person

'I would ask the drivers to have more patience, because sometimes they are so hurried that tell us "quick, quick, quick because I am in a hurry" Then we get on the bus and do not know where to sit, we feel pressurised, without any direction because he (the driver) is telling us that we must do it quickly' (g1-08,).

Consequently, 27 participants, of which 18 were older people, raised concerns regarding the short time that is given to passengers when getting on and off the bus. For example, f4-g5 commented that

'When I have to get off the bus, the bus drivers drive off very fast and they do not look to check that I am clear of the steps. Upon getting off the bus, one must do it fast, we cannot do it fast, and if one does not go down fast, the driver's drive off without care. We can fall, and a fall at our age can be terrible, because it could have very disastrous consequences'

Accordingly, many older passengers stated that they usually get off the bus using the front door not for convenience, but as a strategy to avoid being hurt, as the driver does not see them when they use the rear door (which is the conventional exit door).

Compounding this situation, the older participants indicated that drivers usually stop far from the pavements, and often they do it away from the bus stop. Therefore, the passengers are forced to get off the sidewalk, and even "run" in order to reach the bus. These characteristics of the driving style increase the feelings of being under a time pressure and at risk of being injured, especially for older passengers, as g1-01 who expressed

'haste is our number one enemy, and it is the best friend of accidents'

Prior studies have noted the importance of driver's behaviour and its impact on passenger safety. For instance, the World Health Organization (2007) reports that in many cities there were concerns regarding the insensitivity of bus drivers towards older people. One of the major concerns raised in that study was that drivers do not wait for older people to be seated before starting off. In some cities like Delhi and Geneva, it was reported that bus drivers do not stop close enough to the kerb to enable them to get on and off the bus safely. Other dangerous behaviours were that bus drivers stop at

unmarked locations, particularly at road corners, and exhibit careless driving and disregard for the rules of the road. Surprisingly in the WHO report, ‘transport drivers’ and ‘safety and comfort’ are reported in different sections without an analysis of the strong association between them. The section of ‘safety and comfort’ is only related to crime and crowded buses. Similarly, the report lacks an analysis of drivers’ working conditions.

Undoubtedly, according to this study’s results and the literature review, it seems that driver’s behaviour is associated with passenger safety. However, these results need to be interpreted with caution because it is necessary to understand the context and reasons behind the driver’s behaviour. In line with this, the existence of ‘informal’ transport system in the city causes issues of safety and accessibility for elderly and disabled passengers (Access Exchange International, 2009). Perhaps, the most striking issues arising from the bus system in Guadalajara, as discussed in chapter 4, are that: 1) bus operators compete instead of collaborating to provide a good bus service to users and society and 2) drivers are paid directly out of passenger fare, which is thus linked to the number of passengers they collect. There is, therefore, a lack of cooperation among operators on routes, and drivers compete with each other, even with those on the same route, to collect more passengers. However, it is also important to consider the drivers’ working conditions (shifts, time to rest or eat, among others) and the workload of the job. Kirk et al. (2003) warn of the importance in recognising that the driver’s workload is high due to high levels of traffic congestion, pressure to keep to timetables, and being forced to perform multiple tasks (e.g. issue tickets, handle money, and deal with passengers) at the same time. Furthermore, road conditions and bus chassis design also challenge the driver in providing a good journey experience.

When applying a Service Design approach, it highlights that within the bus service the drivers are the front line staff, and thus may be viewed as the face of the service. Therefore when things go wrong with the service, the users may often put the blame on those staff members who are closest to them. Likewise, Polaine et al. (2013) point out that when frontline staff are let down by internal systems and procedures, they become disempowered and inflexible. This situation usually has an impact on staff performance and leads to poor customer experiences and service failures. Since it appears that drivers’ behaviour is of significance to passengers’ safety, further research should be undertaken to investigate the workload and working conditions of the drivers.

5.5.4.2 Impact of crowded buses and other passenger's behaviour on safety

The World Health Organization (2007) indicates that crowded public transport is common in peak times and presents safety issues for older people. According to the report, although some cities in developed countries have this situation; it is more common in the cities of developing countries. Katz & Garrow (2012) undertook an observational study in Dhaka, Bangladesh, and found that bus door crowding is associated with an increased number of unsafe boarding and alighting movements that occur when the bus has not come to a complete stop. In the current study, almost 80% of the participants reported comments relating to bus capacity. Some passengers highlighted that on some routes it was very common to find crowded buses. This situation was raised as a safety concern by a few younger participants, but by many older participants. It appears that there are no previous studies comparing the effect of crowded buses on safety concerns between younger and older people.

Younger and older participants pointed out that when the bus is crowded it is more difficult to find a safe place to travel within it. Younger people indicated that this situation is worse when they travel with an item in one of their hands such as a document pocket, backpack or, notebooks, among others. Additionally, as there are lots of people traveling standing, and then under those circumstances it is more difficult to hold the handrails. Such situation is even worse for older people when travelling holding something, e.g. bag, stick, etcetera.

Older respondents also indicated the lack of consideration from younger passengers as a safety concern. The main reason for this concern emerges because when the bus is crowded it is more difficult to get a seat to travel, and often preferential seats are taken by able-bodied passengers. This situation compels older users to face the conditions of an unstable journey (e.g. sudden acceleration, deceleration, or harsh braking) whilst standing. An older participant (g1-08) commented

‘It is dangerous because often they [younger passengers] do not give us the preferential seats, thus we have to travel standing, which is risky as the trip is tottery. Frequently, I hurt my arms or wrists, or even we could have a fall’

Accordingly, it seems that traveling standing increases the perception of risk and the potential to be injured. This perception appears to be confirmed by accident research studies. For example, previous analysis of non-collision injuries of bus occupants in

Sweden suggests that 17% of injuries to bus passengers result from falls due to a loss of balance while the bus is in motion (Albertsson et al., 2005). Kirk et al. (2003) analysed data relating to killed or seriously injured road users in the UK, and reported that 56.4% of bus passenger casualties occurred when passengers were not seated.

Studies of older participants support the opinion that it is common to be pushed by other passengers when buses are crowded. Pushing and shoving have been reported to be a problem for older people at bus stops and on boarding buses in some cities (WHO, 2007). In a study regarding the bus service in London, Nickpour et al. (2012) found that older people reported the behaviour of other passengers as a source of intimidation, in particular, participants mentioned pushing and shoving and people not waiting in the queue. Further research is needed in order to explore the reasons for bus crowding; its impact on passengers' behavior and measures which can be employed to counter this.

5.5.4.3 Impact of bus design on safety

The impact of bus design on passenger safety has been investigated in a number of studies using methods such as: analysis of injury statistics (Albertsson et al., 2005; Kirk et al., 2003); simulation methods (Palacio et al., 2009); or a combination of methods such as focus groups, accompanied walks, and interviews (Marsden, Cattán, Jopson, & Woodward, 2010).

In the current study, many of the participants, especially the elderly, stated that their safety is at risk due to the design of the bus. The height and shape of the steps, and the absence or inappropriate placement of handrails seem to be the key bus design features that impact more on the participants' safety concerns. According to the participants' comments, these are usually combined with other issues such as drivers' behaviour, bus capacity, other passengers' behaviour or being under a time pressure. This is consistent with the findings from the study of Marsden et al. (2010), who found that the combination of bus driver behaviour and bus design made public buses too dangerous for frail older people to use.

Steps height was raised as a safety concern issue by most of the elderly, and even by few younger, participants. They stated that the steps are too high, especially the first one, which in combination with being under a time pressure to board or alight because driver could drive off quickly or with the lack of an appropriately placed handrail, might affect their safety. In addition, in some buses the steps are in curved formation as

shown in Figure 5.8, which further compounds the situation. The impact of these factors may be felt when passengers are boarding or alighting from the bus, but there were more comments in relation to getting off of the bus, as illustrated by g3-02

‘When I get off the bus, the last step is the hardest. In addition, steps that are curved in shape are actually very difficult, because I must get off the bus as fast as I can, but at the same time I must tread carefully because on that triangle-shaped step I could fall. This step is more difficult when I get off the bus; it is dangerous, because if I am not careful, and as we go down faster, then we can easily fall, in addition to the risk that the driver starts to drive and can tumble me’



Figure 5.8 Example of a bus with steps in curve (main reason for this design is that the engine is placed in front of the bus-truck)

Previous research has identified that a considerable percentage of people are injured while they were boarding or alighting. Numbers suggest that there are higher percentages of accidents when people were getting off the bus than boarding (Albertsson et al., 2005). With respect to the bus design, Kirk et al. (2003) indicate that slips, trips and falls whilst boarding or alighting can be caused by the step to the kerb height being too high or by the riser steps being of different heights. However, it should be highlighted that in the current study there are some conditions which might aggravate the situation: 1) buses do not stop near to the kerb; hence, stepping from the road increases the height of the first step. Generally the height of first step from the ground is usually 40cm, which is above the recommended dimensions of 15-20cm for older people (Petzäll, 1993). The following steps are about 25 cm, and in some cases there can be variation between them which might cause a loss of balance; 2) The shape

of the steps on some buses is irregular (as shown in Figure 5.8); and 3) participants reported that they usually feel ‘forced’ to board and alight under a time pressure as it is common that bus drivers’ only allow a short time for passengers to do this.

Also important to passenger safety is the existence of easily accessible handrails (Albertsson et al., 2005; Palacio et al., 2009). The absence or inappropriate placement of handrails was reported as problematic by the participants in the focus group discussions. In Guadalajara city, the most common feature of the buses is that the handrails are located in a horizontal position at a height of about 175 cm, which means that many older people (particularly women) as well as smaller people are unable to reach them. For example, a younger woman with a height of 1.43m complained that the handrails are too high and so impossible to use, which increases the possibilities of falling. The older participants expressed similar concerns regarding the handrails position, but they also raised an additional concern that in some buses the handrails are inappropriately placed near to the doors, which increases the risk of falling when getting on and off the bus.

5.5.4.4 Impact of walking distances and bus stop conditions on safety

Being a pedestrian, and walking to the bus stop or to reach a destination after bus use is part of the chain of travel in using the bus service (Lavery, Davey, Woodside, & Ewart, 1996). Previous research on ageing and public transport has tended to study the distances to the bus stop as a usability problem which means that there has been a tendency to observe long distances, poor pavement conditions, lack of pedestrian crossings, as well as concerns about personal safety as barriers to the use of the service (Broome et al., 2009; Carlsson, 2004; Lavery et al., 1996). Related literature on older people and safety has focussed on pedestrians (Jancey et al., 2012), but it has not considered them as being part of the trip chain using the bus service.

During the focus groups some participants, particularly those who were older, were interested in talking about the distances to walk. Older participants were not concerned by the long distances, but they expressed problems related to crossing roads, poor pavement conditions and obstacles along the street. Crossing avenues is unsafe as there is much traffic and no pedestrian traffic lights, hence, people may be forced to dodge traffic in order to cross roads and avenues and given their health and mobility

conditions, this is particularly difficult for older citizens to undertake. For example, g4-06 expressed that

'When crossing the street, generally there is no proper traffic light and everyone wants to go at the same time; thus there are few safe opportunities to pass. We have to take risks and as older people, we do not have the same ability, the same speed ... then it is more difficult for us crossing avenues'

Regarding the pavement conditions, there was at least an older participant in each group who stated that the pavements are not in good condition. They pointed out that obstacles, holes and unevenness are common problems with the pavements, and hence there is some level of risk when walking along them. Some older participants reported situations where they had nearly or actually fallen due to this problem.

Results from this study support the limited literature that has explored how older bus users could face safety hazards whilst walking to bus stops. As an example, in a study with older people in the Leeds area in the UK, it was found that pedestrian journeys were often blighted by steps, uneven surfaces or obstacles such as parked cars or bicycles being ridden on pavements. Crossing the road was a significant hazard because formal crossings were placed inappropriately or did not allow to older people enough time to cross. In that study, the older participants reported that personal safety concerns cause many of them to feel very nervous of either being knocked down or falling over (Marsden et al., 2010).

Although there were not many concerns expressed about bus stops and safety, some participants in the current study stated that the lack of official bus stops and the invasion of the bus stop by parked cars forced them to wait and get on the bus away from the kerb, which is dangerous because users can be hit by other vehicles or by the approaching bus. There has been little reporting of this situation in previous research.

5.5.5 Impact of the problematic issues on usability problems

Designing usable services is part of the aim of a service design approach (Mager & Sung, 2011), and usable environments have been recognised as a basic precondition for travelling (Carlsson, 2004). The concept of usability has been used to explore problems that people face using public transport and this concept is also very important to the provision of inclusive services (BS 18477, 2010). The present study aimed to identify which elements of the transport system impose greater difficulty in the use of the bus

service, and their impact on users; as well as to determine if older people report different impacts from those problematic issues than younger people do. This section presents results and discussion regarding those elements of the bus system that younger and older participants pointed out as problematic in using the service.

Results of this study showed that 31 out of 43 participants reported at least one problem in using the bus service. Similar to the safety concerns, most of usability problems were reported by older participants (23), although younger participants (eight) also expressed having difficulties in using the service. However, the older people made a higher number of comments regarding difficulties in using the bus service. Figure 5.9 shows the number of comments made by younger and older participants concerning usability problems. As discussed above, older people encounter more difficulties doing their daily activities (transport among them) given their decline in functionality due to the ageing process (Rogers et al., 1998; Seidel et al., 2009).

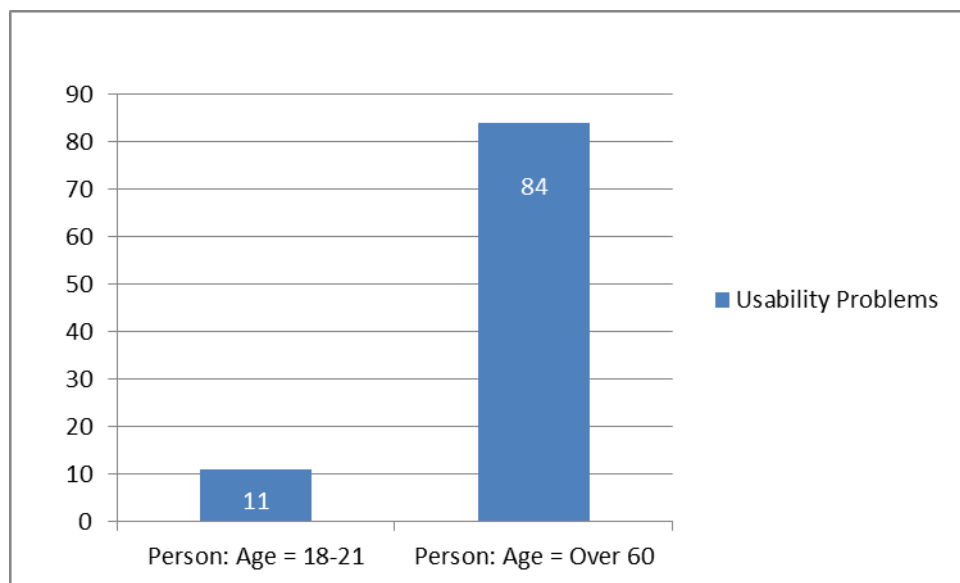


Figure 5.9 Number of comments regarding to usability problems by age group

Among the main problems expressed by the older participants were getting on and off the bus, traveling while standing, moving through the bus, getting in and out of seats, walking long distances and waiting whilst standing. These are problems which have been reported in previous research (Broome et al., 2009; WHO, 2007).

In addition to difficulties in performing those activities, some older participants, especially those with functional severe limitations, stated that they avoid using the service as they consider that is impossible to do it. This situation suggests that there is a

relationship between personal characteristics or limitations and usability problems (Carlsson, 2004). Such is the case of g4-02, who is not a frequent traveller and suffers of arthritis in her knees, who expressed

‘I do not go anywhere and do not use public transport because I cannot use it. It is impossible, because drivers do not have patience with us. They [drivers] do not wait for me to get on the bus’

The analysis found that bus service use is practically affected by many issues, but it seems that issues such as drivers’ behaviour, bus capacity and bus design have a higher impact, but other people’s behaviour, distances to walk and lack of information also were referred to have an impact. Once more, it is important to mention that the impact on passengers’ experience comes through a combination of problematic issues. In the case of usability, this might be evident when considering the design of the bus, bus capacity and driving style. Figure 5.10 graphically shows this relationship and helps to track the content of the following sections.

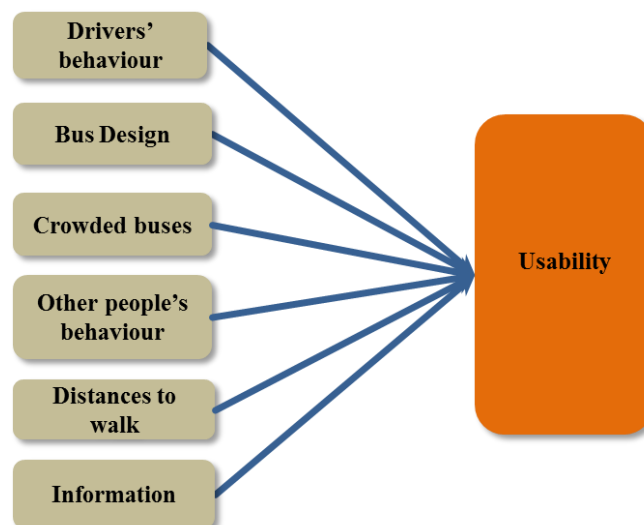


Figure 5.10 Bus service issues with major impact on usability

5.5.5.1 Drivers’ behaviour, payment method and usability problems

Most of the characteristics of drivers’ behaviour have already been described above. Therefore, the key point here is to explain how such behaviour might cause usability problems to the passengers. In the focus groups 23 out of 43 participants (19 older people and 4 younger) recorded having difficulties in getting on and/or off the bus, and they pointed out that these activities are even more complicated: when driver does not consider the passengers’ needs, when the driver is pressurising them to act quickly or

when there is a large distance between the bus step and the kerb. Similarly, the characteristics of a fast, jerky, or bumpy ride was highlighted by several participants as a factor making it more difficult when traveling whilst standing; when moving through the bus; and when getting in and out of the seats.

Drivers' behaviour has not been frequently reported as an issue affecting the use of public transport because the research has focussed more on the physical characteristics of the vehicles or environments (Broome et al., 2009; Broome et al., 2010). However, results from this study are consistent with some studies that have highlighted the role of drivers as a barrier or enabler to use the bus service (Broome et al., 2010; Nickpour et al., 2012; WHO, 2007).

Additionally, younger and older participants expressed the view that drivers do not want to stop and collect them due to the fact that they pay using *transvales*, a payment method which reduces the profits of the drivers. This situation causes more problems to these passengers because they then have to wait for another bus –increasing the waiting time-, which could be difficult for some older users. Finally, an issue of intense concern among the older participants was their belief or the fact that drivers do not want to stop for older users. This is consistent with the findings of the World Health Organization (2007) which pointed out that in some developing countries it was found that drivers were reluctant to pick up older people.

5.5.5.2 Crowded buses, people behaviour and usability problems

It appears that there is a strong relationship between crowded buses and difficulties in using the bus service (Carlsson, 2004; Coughlin, 2001; Katz & Garrow, 2012) as many of the participants stated that when buses are crowded all the problems increase. For instance, a younger user commented

‘Sometimes the bus is too crowded. For example, I have seen that on the route 380 sometimes there is no room even for an ‘ant’, the bus is really full. This causes many problems, because if it is really full then it is very difficult, getting on or off, standing up, moving through the bus, and even security itself’ (g6-02).

The data analysis of 31 out of 43 participants who referred to usability problems provided an understanding as to why and how crowding makes all aspects of bus use more difficult. For instance, when buses are crowded it increases the possibilities that drivers do not stop which therefore prolongs the waiting time and so the service

becomes uncertain since users do not know if a driver is going to stop or not. Some participants stated that they frequently have to wait for two or three buses to go past before catching one.

According to the participants, the reasons that make it more difficult to get on and off the bus when it is crowded related to: 1) The driver is in a hurry because he has stopped several times and so he has less time to reach his destination; thus, he reduces the time he allows for passengers to get on and off in order to make up. 2) There are many people in the area of the doors which impede access to it and its use. This situation is consistent with the observations of Katz & Garrow (2012), who found that bus door crowding negatively affects the service operation.

The older participants also highlighted that getting a seat can be nearly impossible when the bus is crowded because there are no free seats; hence they are forced to travel standing. This is made more difficult by the driver's driving style and by the lack of opportunity to hold onto the handrails. Some participants pointed out that this situation may cause some passengers to push into each other.

5.5.5.3 Bus design and usability problems

Many of the participants recorded problems relating to elements of the bus design such as high steps, seats, aisle, handrail, and bell position, number of seats or poor visibility of the route number. All these elements were related to usability problems and again the highest impact was in the actions relating to: getting on and off the bus, traveling whilst standing, moving through the bus and getting in and out of seats.

Problems in getting on and off the bus are the most common difficulties that older people report in using the bus (Coughlin, 2001; Glasgow & Blakely, 2000; Rogers et al., 1998; WHO, 2007). Step height onto the bus is generally highlighted by older people as the main cause of these difficulties (Broome et al., 2009). This can be explained by understanding that walking on stairs is a high demand task, which challenges not only the strength of the legs, but also requires balance and muscle coordination (Redfern et al., 2001).

However, in this study along with the height of steps, participants noted that it is a combination of bus design features and service provision that causes them difficulties. For instance, difficulties regarding the height of step were related to driving style, time

provided to get on and off, distance between the bus and kerb, crowded buses, and other passengers' behaviour. Older participants added that the shape of steps, and the lack or inappropriate placement of handrails also have a strong relationship with difficulty in boarding and alighting. In line with this, an older participant g1-04, said

'Regarding the design of the bus, I can tell you I have problems, especially with some buses that have curved stairs. But also they are too high; I find it very difficult to get on and off the bus. Once, a person got on one of those buses, he was more disabled than me, and even though the driver was waiting, that person had a hard time climbing up with his walker!'

Additionally, there were a few younger participants who also stated problems with the steps and handrails design. However, it is worth mentioning that these participants had a particular physical characteristic or a temporal disability, which did not enable them to use the bus in the same way as the other younger participants in this study.

Participant f5-03 for instance, whose height is 1.47m, commented

'To me, the first problem is the design of the bus, because that is what causes me problems because I'm short. The first step causes the biggest problem as it is too high. But there are other buses with curved stairs, where the handrail is too far away to reach. So, I almost have to hold the second step to climb up to the first. That's even harder when I have some things in my hand'

Similarly, g5-05, who was recovering from a leg injury, said

'I recently had an accident and my leg is injured. Therefore, I can hardly walk up the steps because they are very high'.

Participants who recorded problems in traveling whilst standing and moving through the bus stated that along with the driving style and crowded buses, the narrow aisle and the inappropriately placed handrails in the bus are factors that increase the difficulty in its use. Concerning the handrails, two design characteristics were observed as problematic: 1) the lack of handrails in some areas of the bus, and 2) handrails being placed too high for some participants to reach for use. These characteristics were mainly commented on by the older participants, who lack arm strength or who have trouble stretching their arms, or by smaller participants. On the other hand, the narrow aisle was mainly noted as problematic by the younger participants, and it was always

related to crowded buses and/or when the passengers themselves were traveling carrying some belongings such as a backpack or document pocket.

Seat layout and reduced seat pitch, along with driving style and peoples' behaviour, were identified as causes that make it difficult to get in and out of the seats. Participants said that usually passengers use the aisle seats because it is easier to get in and out of them, especially if the bus is moving. This situation forces a new passenger to use the windows seat which they have to access through an area confined by the aisle seat passenger.

Finally, 12 participants (six younger and six older) stated that the route number's design was a problem in identifying the correct bus and that the difficulty worsened at night-time or when there were many routes on the same road. Similarly, other participants recorded some comments relating to the bell position as being problematic when getting off the bus because generally there is only one bell, which is placed at the rear of the vehicle. This situation makes it difficult for passengers who are in the middle of the bus to ring the bell as well as for those who try to get off by the front door as is the case for older people.

Most of the bus design features noted as usability problems by the participants have been pointed out in previous studies (Broome et al., 2009). However, the analysis of focus group discussions from this study led to an understanding that bus design is not an isolated problem, but rather that its combination with service characteristics (e.g. driving style, crowded buses and other people's behaviour) make the problems even greater.

5.5.5.4 Distances to walk, bus stop conditions, waiting time and usability problems

As noted earlier, walking to the bus stop may cause some safety-related problems such as risk of falling or being hit by a car when crossing roads, but also some older participants stated some problems relating to the use of the pavements i.e. they are in a bad condition e.g. they are uneven or have holes, or there are many obstacles e.g. cars, shopping stalls, roots of trees, etc. Therefore, using such pavements might be dangerous or difficult, or, in a number of cases for some older people, impossible. Figure 5.11 shows an example of a pavement where the roots of a tree have destroyed the pathway. Moreover, older participants said that due to their health conditions, it is difficult to

walk long distances, especially if they need to walk uphill or when the weather is very hot.



Figure 5.11 Example of a pavement in bad conditions due to growth of roots tree

Some participants commented on usability problems relating to the bus stops. These problems were: the absence of the official bus stops and the bus stops being blocked by other vehicles which prevents bus drivers from pulling up to the kerb, which then forces the passengers to wait and board the bus from the road. The lack of seats at the bus stops was another problem which was raised and this related to the waiting time. Some older participants commented that is difficult to wait whilst standing, especially when they have to wait for a long time.

Long distances to the bus stop, uneven footpaths or footpaths with obstacles, lack of bus stops, lack of seats at the bus stops, and poor weather have been reported in previous studies as barriers in the use of the bus service by older people (Broome et al., 2009; Lavery et al., 1996; Marsden et al., 2010). It has been also established that older people generally cannot walk as fast or as far as younger adults (Burton & Mitchel, 2007).

5.5.5.5 Information and usability problems

Previous studies have identified that older people experience some difficulties due to incorrect information (Carlsson, 2004), or the lack of real-time information at the bus stop (Coughlin, 2001). However in this study, some participants made complaints regarding the total lack of information. They pointed out the absence of maps, timetables and a reliable and institutional source of information. Thus, when passengers

want to go to an unfamiliar place, they have to ask friends or a relative, which often generates confusion resulting in problems in using the service or even avoiding using it altogether. For instance, g4-05, an older participant expressed that

'I hardly go anywhere, since I do not know the routes; if I would have to go anywhere, I would need to ask where the bus stops are, and where the bus takes me'

5.5.6 Impact of the problematic issues on passengers' comfort

Passenger comfort has been previously studied from an ergonomic perspective (e.g. Jianghong & Long, 1994; Kogi, 1979; Osborne, 1978), and it has been pointed out that is one of the attributes that passengers expect to find in a good bus service (Balcombe et al., 2004; Molinero & Sanchez, 2005; Redman et al, 2013). According to Kogi (1979) the negative impacts on comfort can relate to physical or postural factors (mainly caused by inappropriate sitting postures), mental factors (caused by psychological concerns such as worrying about the destination or luggage), and environmental factors (caused either by undesirable environmental factors like noise and temperature, or by conflicts with other passengers). In the current study participants reported discomfort either in a physical sense e.g. older participants who experienced discomfort due to knee pain when getting off the bus or in a psychological sense e.g. participants who felt uncomfortable because the bus driver did not reply to a greeting.

25 out of 43 participants in this study recorded some comments regarding experiencing discomfort when using the service. During the group discussions, participants shared their perceptions about the lack of comfort in using the bus service. For example, g7-03, a younger participant mentioned that

'I do not like bus service because there is no comfort; the travel experience is really unpleasant'

Unlike what was observed with the impact on safety and usability, there was a higher percentage (71%) of younger participants who expressed having comfort problems in comparison with the percentage of older participants (50%). However the reported causes of discomfort that younger and older participants experienced were different. For example, older participants reported discomfort caused by the height of the steps, while younger participants complained of a lack of room when the bus was crowded. This difference is consistent with Kogi (1979), who reports that commuters and students associated comfort with better air-conditioning, comfortable seats, luggage space, and

access to equipment operated by passengers; while spatial features of the vehicle itself, such as better and lower entrance steps, were demanded by housewives and elderly people.

According to the participants in this study their comfort experience is mainly impacted by public transport issues such as driving style, drivers' attitudes, bus capacity, other peoples' behaviour, bus design and waiting time. The reasons as to how comfort is impacted by these issues are presented below. However, it is important to highlight that similar to safety and usability, the impact on comfort is caused by a combination of bus service issues. For instance, this situation may be evident when considering the design and capacity of the bus. Figure 5.12 graphically shows this relationship and helps to track the content of the following sections.

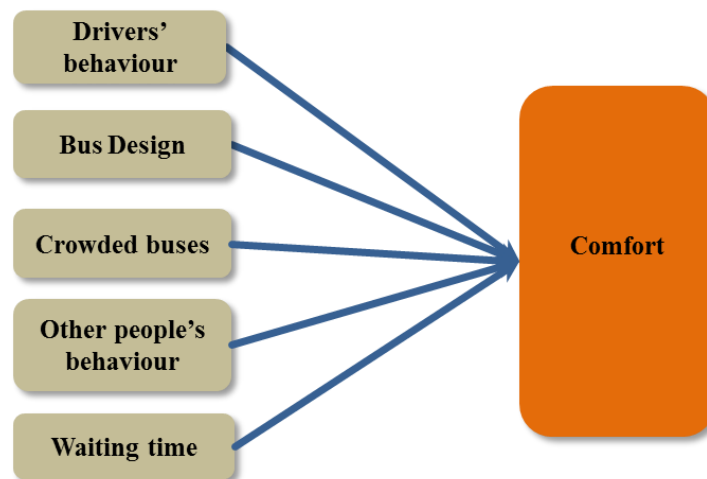


Figure 5.12 Bus service issues with major impact on comfort

5.5.6.1 Drivers, payment method and comfort

Driver behaviour has not been reported as a cause of discomfort in previous studies. However, most of the research on passenger comfort has been related to trains (Howarth, Griffin, Childs, Fujiyama, & Hodder, 2011; Kogi, 1979), and, in such cases, the drivers' behaviour has a lesser impact on the passengers' experience. In this study some participants highlighted that bus drivers' behaviour might have a negative impact on their perception of comfort. It is worth noting that some issues that represented safety concerns or usability problems for the older participants in the study were reported as uncomfortable experiences by some younger participants. As a participant aged 20, g2-06 commented

‘Sometimes the drivers drive very fast and therefore it becomes a very uncomfortable trip. For example, if the driver drives too fast and I’m sitting in the back, then the bus ride seems more jumpy, passing any little bump and jump, it’s very uncomfortable’

Nevertheless, older participants also expressed two aspects relating to drivers’ attitude that affect their comfort. Although these aspects have already been stated above concerning safety and security, they have also been raised as a source of discomfort. Firstly, the fact that the drivers’ pressurise the passengers to get on and off the bus quickly was pointed out as a very uncomfortable situation, both psychologically by having to endure the pressure and physically as some older adults may experience pain in their knees, arms or wrists. Secondly, incidences when drivers ask them to get off using the back door were also expressed as a very uncomfortable experience. Participants stated that even though not all drivers do it, there are some who tell the passengers that the proper way to get off the bus is using the back door; some participants stated that some drivers even compel users to use that door. Therefore, some older people expressed having feelings of discomfort and uncertainty when getting off by the front door.

Additionally, there were other comments related to uncomfortable experiences and drivers’ attitude towards passengers. Many of the participants pointed out that paying with *transvales* was really uncomfortable because the majority of drivers do not like to receive this kind of payment. Consequently, some drivers might show displeasure towards those using *transvales*, who are usually students (younger) and older people. In addition, some participants stated that the act of paying using *transvales* is uncertain because the passengers never know if they will receive bad treatment from a moody driver. This mistreatment could be shown in several ways. For instance, the driver does not stop for passengers when he knows they are going to pay using that concession; or there are a range of actions by the driver such as snatching the *transvale* and throwing it to the floor, taking a lot of time before accepting the *transvale* and driving off aggressively, among others.

5.5.6.2 Crowded buses, people behaviour and comfort

Overcrowded buses have been reported as a cause of discomfort in previous studies (Howarth et al., 2011; Katz & Rahman, 2010; WHO, 2007) and in this study, the participants consistently complained about the lack of comfort when the buses were

crowded. This topic was more common in the discussions with younger people, although some older people also expressed this view.

Many participants stated that an obvious source of discomfort is the lack of seats because it forces them to travel whilst standing, which along with the driving style, peoples' behaviour and bus design can cause an uncomfortable experience. There were however additional causes of discomfort such as insufficient room between passengers which compels them to stand too close each other; and also other people's behaviour, which according to some participants it is not always good. For example, g5-05 commented

I do not like it when the bus is full because people are so clumsy. People are not cautious, we are all cramped together, and people are not aware. They push me and stand tight against me. That's horrible, yes it is.

Furthermore, two participants stated that they feel dizzy when the bus is full of people and this is consistent with the findings in the report of the World Health Organisation (WHO, 2007).

5.5.6.3 Bus design and passenger comfort

Bus design has received the most attention from ergonomics researchers, particularly with respect to bus seats (Jianghong & Long, 1994), but the spatial characteristics and lower entrance steps have also been identified as causes of discomfort for older people (Kogi, 1979). In this study, some characteristics of the bus design were related to a lack of comfort. The main design characteristics reported by the older participants were the height of the steps and, the number of seats and their layout. These participants reported that the number of preferential seats is less than the number of disabled and older people. A few older people also commented that the seats are uncomfortable because they are built with rigid materials.

On the other hand, the presence of narrow spaces between seats, and a narrow aisle width were identified as a source of discomfort in the discussions with the younger participants. They stated that is not a comfortable experience for them to travel standing or move through the bus when the aisle is narrow. Similarly, getting in and out of the seats was reported as cause of discomfort due to the small gap between them. In both cases, the discomfort is increased when the users are traveling with belongings in their hands. For instance, g5-01 expressed

'Travel experience is linked with the design of the bus, because if the bus is not well designed we will not travel comfortably, and we will not have room to move should something unexpected happen'.

5.5.6.4 Bus stops, waiting time, information and comfort

The lack of shelter and seats at the bus stops might cause some complaints among bus users (WHO, 2007). In this study, some older participants reported that they experienced discomfort when there is a long time to wait and there are no seats at the bus stop. The younger participants however identified as causes of discomfort, the uncertainty associated with what time the bus might come, or if the drivers will stop for passengers. One younger individual stated

'What bothers me most when using public transport is the waiting time, especially because the route I use to come to the school means that I have to wait a long time; often 20 minutes. The main problem is that we never know when the bus is coming, or if the driver is in good mood to collect us' (g5-04).

5.5.7 Impact of problematic issues on passengers security

In the current study, 11 out of 43 participants commented on at least one aspect relating to security when using the bus service. They included younger and older people, but the number of younger participants who expressed security concerns was higher.

The analysis of those concerns revealed two themes: 1) fears that someone may steal their belongings, for instance some participants commented about the possibility that someone might take their wallet, mobile or any other thing of value; and 2) perceptions of being personally at risk due to other peoples' behaviour. These concerns were related to perceptions that they might be at risk of being assaulted or suffer from mistreatment or harassment by another bus user. This situation was mainly raised by female participants. Regarding to these concerns two women, an older and one younger respectively, stated:

'I am afraid when I use the bus because there are no security controls on the buses. The problem is that all kinds of people use the service, so they [other users] may be drunk or be drug addicts. They should not get on the bus because they are dangerous. These people can cause problems. I would prefer it if people with poor appearance were not allowed to use the service' g2-04.

'It involves physical contact with people. So, I think some users often take advantage of that situation, and it is common that they get too close to the women. This situation makes me feel that I'm under risk when use the bus service' (g5-04).

According to the participants in this study, their security was mainly affected by public transport issues as crowded buses, bus stop location and waiting time. The reasons as to how security is affected by these issues are presented below. Figure 5.13 graphically shows this relationship and helps to track the content of the following sections.

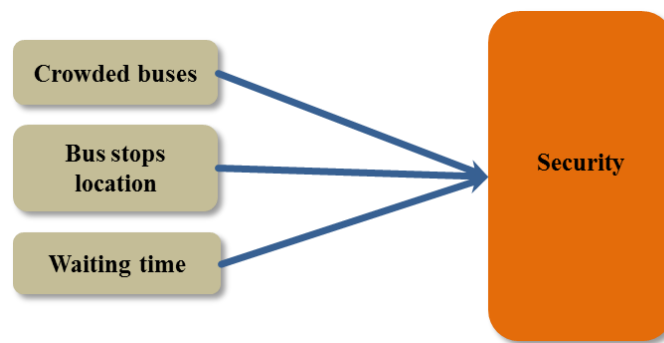


Figure 5.13 Bus service issues with major impact on security

5.5.7.1 Impact of bus capacity and passenger security

Crowded buses were identified as the main issue that impacts on the participants' sense of security. Several participants expressed that when buses are crowded it is more common and easy to lose their belongings. A few participants even recounted some experiences where they were involved in a criminal incident. For example, g7-05 commented:

'I have been robbed a couple of times on buses; they [thieves] have taken things out of my bag'

5.5.7.2 Bus stops, waiting time and passenger security

Some female participants expressed their concerns regarding their security when they are waiting for the bus, especially at night. Bus stops in isolated places and/or those which were poorly-illuminated were pointed out as risk factors. As g7-01 stated

'I think it may be unsafe, because first of all the bus stops can be in very dubious places. Bus stops need more supervision, which would make them more secure'

These findings are consistent with those in the literature which suggest that perceptions of being at risk due to crime are common amongst bus passengers (Broome et al., 2009;

Coughlin, 2001; Nickpour et al., 2012; Peel et al., 2002; WHO, 2007). Similarly Molinero & Sanchez (2005) also report that bus users state concerns relating to criminal incidents.

5.6 Critique of the study

In general, focus groups were an effective method for gaining information of passengers' experiences, as the participants were willing to share their perceptions, needs, and desires of the bus service. This is consistent with the finding by Barrett & Kirk (2000), who stated that this technique is appropriate to gain an insight into the research topic and the needs of a specific group of people, and it is a useful tool to obtain information regarding how people think and feel about some matter.

The structured version of focus groups used in this study provided additional benefits. Firstly, the use of cards and prompts provided a broad range of elements of the bus service that the participants were able to talk about. Secondly, the participants were able not only to identify the problematic issues, but also to prioritise them. Therefore this technique offers the opportunity of determining the issues that impose greater levels of difficulty to younger and older users. Finally, since all the participants were provided with an opportunity to express their views, it helped to avoid bias caused by the domination of one or two people in the group, which is often a disadvantage with the focus groups method (Robson, 2011).

The main potential limitation of the study relates to the inherent self-report bias within it. Self-report measures rely on the accuracy of the participant's judgements, which can be affected by educational, cultural, language and social differences (Johnson et al., 2010). Participants in the study may not report all issues affecting their experience, e.g. older participants did not raise many issues relating to comfort. This does not mean that they experienced high levels of comfort using the service, but that according to their judgements, issues concerning safety and usability were more significant. However, the use of self-reporting provided a large volume of data from the users' point of view and the results from this show a range of issues identified by younger and older participants that would not be readily apparent to transport service designers, or even other group of passengers, especially since some of these issues have a personal and temporal element.

5.7 Conclusions

With a view to generating data for designing a more inclusive bus service, this study aimed to investigate the problematic issues that pose most difficulty to users as well as understand their resultant impact on the service experience of younger and older passengers. The use of an inclusive service design approach enabled a more complete understanding of the big picture of the bus service from the perspective of younger and older passengers. Equally, the structured version of focus groups used in this study allowed participants not only to identify a broad range of problematic issues, but also to prioritise them.

The results suggest that the younger and older participants prioritised the issues that impose greater difficulties to them in different ways, and that they were affected differently by these problematic issues. More specifically, the study leads to the following conclusions:

- Younger and older people prioritised the issues that impose greater difficulties in different ways. Younger participants stated that drivers' behaviour, crowded buses and waiting and traveling time were the most problematic issues for them, while drivers' behaviour, bus design and crowded buses, followed by distances to walk were highlighted as more problematic by the older participants. These findings should be used for prioritising areas of intervention for service improvement.
- A long list of problems was stated by the participants in relation to each element of the bus service. Although, younger and older people expressed concerns towards most of these elements, each age group of participants expressed different reasons as to why the issue was problematic for them.
- The analysis of the results suggests that the impacts on the users' experiences are not produced by isolated issues, but by a combination of them. For instance, along with the height of the steps, older participants expressed that it was a combination of bus design features and service provision which caused their difficulties. Thus, the height of the steps, driver behaviour, short time for boarding, the lack of or inappropriately placed handrails, distance between the bus and the kerb, crowded buses, and other passengers' behaviour were pointed out as having a strong association with difficulty in boarding and alighting.

- The data analysis enabled identification of negative impacts of problematic issues on users' experience. This impact mainly affected the participants in terms of personal safety and security, usability problems, and passenger comfort.
- One of the more significant findings to emerge from the data analysis was that younger and older people were affected by these problematic issues in different ways. Personal safety and usability problems were stated as the most affected areas for the older participants, while comfort was reported as the main affected area for the younger participants. These findings allow inferring what younger and older people need and expect when using the bus service.

The findings from this study support the idea that given the demands imposed by the bus service and the reduced capabilities of older users, the gap between what users need and want from the service and what service providers actually offer was wider for the older passengers. However, since people do not always do what they say they do, and even though self-reporting can potentially provide data relating to people's capability, performance measures and observation are also needed to achieve a more comprehensive view of the variation between the capabilities of these age groups and their needs in using the bus service (Sainio et al., 2006).

Chapter 6 Observing differential impact of the bus service on younger and older people

6.1 Introduction

Based on the analysis of participants' self-reports (i.e. focus groups), the study in Chapter 5 has suggested that older people face greater and different problems when using the bus service compared with younger passengers. This was particularly evident through the way that each group of participants graded differently the problematic issues of the bus system. Moreover, the results also suggest that those issues had a greater impact on older people. Differences among young and older people using the bus service are consistent with those reported by Broome et al., (2010). However, the nature of the previous study provided a subjective assessment based on the self-report of participants. Although this is a valuable technique to identify problems using the bus service, their subjective experience might also be disproportionate to reality (Broome et al., 2009). In contrast, performance observations or measures allow an objective assessment of passengers' behaviour and a comprehensive view of the variation between population groups (Broome et al., 2009; Sainio et al., 2006).

The literature review in Chapter 2 identified a series of studies related to ageing and public transport (Broome et al., 2009; Coughlin, 2001), and also showed how the behaviour of passengers can be considered in terms of the demands imposed by the transport system, the capabilities of the individual, and the gap that exists. Most of those studies have focussed on the use of the bus service by older people (Broome et al., 2010), but it appears that there is a lack of research which has compared the differences on the gap between the personal abilities of younger and older passengers considering the demands that using the bus exerts. Furthermore, the majority of reported studies have used self-report methods as the primary source of data, which lack the objectivity in data collection that is desirable.

The study reported here was intended to help fill this gap, by observing unobtrusively behaviours of passengers using the bus service in Guadalajara, Mexico. The intention was to observe differences in terms of behaviour among young and older passengers

travelling by bus, but it was also an aim to investigate how the bus service elements influence the passengers' behaviour.

6.2 Aims

The aim of this study was to investigate the relationship between the bus service characteristics and the behaviour differences among young and older passengers in the context of a series of journeys using the service. Specific objectives were:

- To identify the bus service characteristics that have an impact on passengers' behaviour
- To identify differences in passengers' behaviour among young and older people when boarding, travelling on, and alighting buses.
- To investigate differences in the gap between personal abilities of younger and older passengers considering the demand that using the bus exerts
- To identify the characteristics of the service that impose specific difficulties in use of the service for some passengers
- To complement, corroborate or counter some of the findings of the (previous) focus groups study

6.3 Study rationale

6.3.1 Choice of methodology

The study reported in this chapter was an observational study: it set out to observe and measure some bus passengers' behaviours while they were traveling on buses. This methodology is in contrast to a self-report approach (e.g. focus groups, interviews, or surveys) which would identify views, feelings, attitudes or opinions reported by participants. This self-reports is valuable in terms of understanding how people perceive the service. However, as Hammersley (1990:597) suggests 'to rely on what people *say* about what they believe and do, without also *observing* what they do, is to neglect the complex relationship between attitudes and behaviour'. The observational approach used in this study allowed identifying more 'real' behaviours (Robson, 2011) – i.e. identify what people actually did when they were in their natural context using the service at different times (Paterson, Bottorff, & Hewat, 2003). Direct observation also enabled identifying the impact of bus service characteristics which participants could have not reported in focus group discussions (Chapter 5). Moreover, this method

enabled direct comparison of the differences between young and older passengers as it enabled collection data from many participants.

6.3.2 Variables and observed behaviours in the study

The study aimed to observe people's behaviours along stages of boarding, travelling and alighting; therefore, a fundamental requirement in order to include each variable and encode each passenger's behaviour was that all of them should be observable. The variables and coded behaviours comprised in this study, as well as reasons for inclusion are shown in Table 6.1.

Table 6.1 Observed/measured behaviours and reasons for inclusion in the study

Stages	Variables and observed behaviours	Reasons to be included
Any stage	Passenger type according to age (18-50 and 60 and over)	<ul style="list-style-type: none"> • To observe differences in the gap (if any) between personal abilities of younger and older passengers and the demand that using the bus exerts. • To observe if bus service has a different effect on the passengers' behaviour of these age groups.
	Gender	<ul style="list-style-type: none"> • Although gender was not recorded for all passengers, it was possible to determine this for a percentage of passengers.
Getting on	Time to board	<ul style="list-style-type: none"> • Time taken to board the bus is an objective measure, which can help compare differences among young and older people. • Differences in boarding time can indicate that these groups of passengers have different needs when they use the bus service. • Although time to board depends on the ability of passengers (Petzäll, 1993), these differences can also indicate that stairs design affects young and older people differently. • For older people longer times to board and move to a seat might imply greater risk of losing balance and falling due to bus movement
	Use of handrails (to board the bus, when paying and moving to a seat)	<ul style="list-style-type: none"> • This behaviour could indicate that passengers are using a proactive control mechanism to avoid losing balance. These sort of mechanisms 'are those that take place before the body encounters a potential threat to stability' (Redfern et al., 2001:1159). • Identifying that passengers perceive a need to use the handrails might indicate they are 'aware' of the presence of fall risk. • It was expected that older people exhibit this behaviour more than young passengers because tasks involved on this stage, particularly climbing stairs, require leg strength, balance and muscle coordination; which are usually diminished with the ageing process (Rogers et al., 1998).
	Loss of balance	<ul style="list-style-type: none"> • Loss of Balance might indicate an effect of the moving

		<p>bus on passengers.</p> <ul style="list-style-type: none"> • Differences among young and older people might indicate that bus movement has a bigger effect on older passengers. • This can help identify whether older people have different needs in order to use the bus service. • It is related to passengers' safety, particularly for older passengers. Decrease in postural control in older people is believed to be an important factor in the likelihood of a fall (Redfern, Moore, & Yarsky, 1997).
	Whether driver drove off before the passenger was seated	<ul style="list-style-type: none"> • This behaviour has been identified as a usability problem and as a cause of safety concern by older people (Nickpour et al., 2012). • It allows observing whether this behaviour is common among the bus drivers in the city. • It is possible to analyse if drivers modify their behaviour according to the kind of passengers.
Traveling	Traveling standing or seating	<ul style="list-style-type: none"> • It might indicate a passenger's preferences or the lack of sufficient seats for all the passengers. • It was expected that young passengers may offer the seats to older people. • Traveling standing might involve a greater risk for passengers, especially for older people, due to sudden acceleration, deceleration, or braking. Some studies have found that most of injuries on bus passengers occur when they are not seated (Halpern et al., 2005; Kirk et al., 2003).
	Using a priority seat	<ul style="list-style-type: none"> • It was expected that only older passengers exhibit this behaviour. This behaviour might indicate if older people prefer to use those seats. • It was also coded if <i>priority seats were available</i>, which indicates that there were sufficient seats for them; or if priority seats were being used by young or able bodied people. • It shows that the bus might be crowded
	Chosen seat (or place if standing) to travel	<ul style="list-style-type: none"> • The place for traveling might indicate preferences of young and older passengers. • A previous study found that mobility-disabled people tended to use seats in the front space (Hwangbo, Kim, Kim, & Ji, 2012). • The chosen seat was used as a control variable to analyse boarding time for each group of passengers.
Getting off	Time to alight from bus	<ul style="list-style-type: none"> • Similar reasons than the time to get on the bus, but this measurement also allows the determining of any difference between time to board and alight.
	Used door for alighting	<ul style="list-style-type: none"> • The rules for using the bus service state that all passengers should use the rear door for alighting. However, a study aim was to observe whether groups of passengers have different patterns of behaviour doing this task. • According to the findings of the previous study (Chapter 5, focus groups), it was expected that older people would more frequently use the front door to alight. • Differences in this behaviour might indicate that older people specifically might prefer to use front door. The reasons could be because they are close to that door or because they think that is safer than using the rear door.
Independent travel	Travels independently or accompanied	<ul style="list-style-type: none"> • If passengers, particularly older ones, are traveling independently this indicates they are able to use the bus system and overcome the barriers by themselves.

		<ul style="list-style-type: none"> • It is desirable that people can use products and services independently. • Some participants in the focus group study (particularly infrequent bus users) expressed concerns of travelling unaccompanied. • Dependence is considered when the adaptation of the environment or the use of technical aids cannot compensate for disability and the help of a third person is needed to carry out activities of daily living (Millán-Calenti et al., 2010).
	Need for help	<ul style="list-style-type: none"> • It was expected to observe some older passengers asking for or receiving help at any stage of the journey due to their physical characteristics. • Some participants in the focus group study commented that sometimes they needed support by other users to complete some tasks when using the service, e.g. holding the hand of another user when climbing down steps.
	Use of a mobility aid (also called assistive device)	<ul style="list-style-type: none"> • The use of a mobility aid indicates the presence of a physical disability of the passenger • If not many people were observed using a mobility aid, it might indicate that mobility-disabled people are not able to or prefer not use the bus service. • Assistive devices can potentially compensate for disability and lessen handicap and thus increase independence (Edwards & Jones, 1998)
Bus service characteristics	Bus design (steps shape and height, handrails, seats layout, bell position)	<ul style="list-style-type: none"> • Observations on bus design help to understand passengers' behaviours. For instance, Petzäll (1993) found lower times when boarding buses with less number of steps, among slightly ambulant disabled people.
	Driving style and/or driver's behaviour (e.g. driving off too early, parking too far from the kerb),	<ul style="list-style-type: none"> • Driver behaviour might help to understand passenger's behaviours. For instance, parking too far from the kerb makes it more difficult to get off the bus for some shorter or older people (Petzäll, 1993), therefore, passenger might take more time or use different behaviour to complete the task. • Some driver's behaviours might discourage passengers from using the service.
	Crowded buses	<ul style="list-style-type: none"> • Crowded buses have been related to passenger behaviour, e.g. door crowding has been associated with longer marginal boarding times and an increased number of unsafe boarding and alighting movements (Katz & Garrow, 2012).
	Unstable journeys	<ul style="list-style-type: none"> • Whether a journey is unstable might have impact on passengers' behaviour, e.g. loss of balance or higher use of handrails.

6.4 Method

6.4.1 Overview

This study comprised the observation of bus passengers' behaviour whilst they were using the bus service. Observations were made taking into consideration the age group as the independent variable: young and older people. A range of dependent variables were observed: time to get on and get off, loss of balance, seating preferences, preferred door to get off the bus, among others. Some elements of the bus service were also observed, including driver and other passengers' behaviour, bus design and level of crowding. Data were analysed to determine whether or not young and older passengers exhibit different behaviour according to their own capabilities and/or to the service characteristics. The results are discussed in terms of how bus service components influence differently young and older passengers' behaviour.

6.4.2 Participants

Participants consisted of 333 bus passengers, who used the bus service during the observation periods. One hundred and eighty nine (56.8%) of them were young people and 144 (43.2%) were people judged as older passengers. Young passengers were aged approximately between 18 and 50 years old, the other group were passengers aged 60 and over. The age of passengers was estimated on the basis of physical appearance and capabilities – for example grey/white hair, wrinkles, and/or slower movements indicating an older passenger. An additional criterion to estimate the age was the payment method due to some older passengers using a special ticket concession. A gap of 10 years in the age of these groups of passengers was used in order to avoid mis-estimating the age of people between 50 and 60 years old as part of one age group or another. Although age estimation is less desirable than age obtained by self-report of participants, in this study it was not possible to gather direct reports. However, age estimates have been used reliably in previous studies with observational methodologies (e.g.see Pfeffer, Fagbemi, & Stennet, 2010; Zeedyk & Kelly, 2003).

6.4.3 Observation framework

Based on the literature review, and on a pre-test and pilot (see below) an observation framework was especially developed for this study. As shown in Figure 6.1, the framework consisted of observing a series of passengers' behaviour along the boarding, travelling and alighting stages; bus service characteristics; and external factors relating

to the bus service. Subsections 6.4.3.1 to 6.4.3.4 describe how passengers' behaviour was observed, measured and recorded. Subsection 6.4.3.5 describes what was observed and recorded from the bus service system and external factors.

	Stage of journey		
	Boarding	Traveling	Alighting
Observed Passengers' behaviour by stage	1. Climbing steps 2. Gripping handrails 3. Losing balance 4. Moving to a seat	5. Traveling standing or seated 6. Using a priority seat 7. Chosen seat or place to travel	8. Standing up 9. Moving to the exit door 10. Used door to exit 11. Descending steps and alighting
	12. Independent travel; 13. Needing any help; 14. Using a mobility aid		
Bus service characteristics (at any stage)	Crowded buses, steady or unsteady trips Driving style, drivers' attitudes and behaviour Bus design, entrance, steps, seats, use of handrails, gangway, bell		
External factors (at any stage)	Bus service infrastructure, roads, bus stops, pavements Other road users, traffic		

Figure 6.1 Observation framework used for data collection

6.4.3.1 Journey stage 1: Boarding the bus

Climbing steps. In this activity the observer was looking for particular patterns of behaviour that younger and older passengers exhibited. It was also observed whether passengers were starting from the road level or from the pavement.

Gripping the handrails. This was observed during the stages of boarding (including the moment that the passenger climbed the stairs, made the payment, and moved to a seat) and alighting from the bus. The researcher observed whether passengers grasped the handrails, and recorded this behaviour noting Yes (Y) or Not (N) in the record sheet. It was also observed and recorded particular patterns of behaviour that younger and older passengers exhibited, i.e. using both hands or not.

Loss of balance. The researcher was looking for the presence or absence of the protective responses to a fall or loss of balance. These responses could involve movements of both upper and lower extremities, for instance grasping, arm swing, hip and ankle motion, and compensatory stepping (Maki & McIlroy, 1997; Redfern et al., 2001). However, due to difficulty in observing hip and ankle motion, only if passengers

showed strategies as grasping, arm swing and a compensatory step then behaviour was coded as loss of balance. This behaviour was observed when a passenger was climbing the steps, paying and moving to a seat, and recorded as Y/N.

Time to board the bus by young and older passengers was measured from the moment that the bus driver opened the front door until the passenger got a seat or a place to travel standing. Time was measured in seconds and a stopwatch was used to record it.

At this stage was also observed and registered when *the drivers drove off before passengers were seated*. Each time that was recorded a passenger getting on, it was also recorded if the bus driver drove off before passenger was seated or had moved to their final standing position. The observer recorded when passengers were boarding at a red traffic light because in that situation the driver had to wait for the green light before driving off.

6.4.3.2 Journey stage 2: Travelling

Traveling standing or seating. Coding this behaviour consisted of noting if the passengers were traveling standing or seated. This was done after passenger had paid and moved to a seat or the final standing position. When a passenger travelled standing it was noted whether or not there were seats available. The observer was also looking for particular patterns of behaviour that passengers showed, i.e. moving to another seat, preferences for any particular group of seats, among others.

Using a priority seat. Whether or not passengers used a priority seat to travel seated. It was expected that only older passengers exhibit this behaviour. It was also coded if priority seats were actually available (i.e whether they were already occupied).

Chosen seat (or place if standing) to travel. Recording consisted of noting the number of the seat in which the passenger was traveling if was seated, if not it was coded as standing.

6.4.3.3 Journey Stage 3: Alighting

Time to alight the bus by younger and older passengers was measured from the moment that the passenger stood up from the seat (or started to move from their travel position on the bus) until he/she got stepped onto the road or pavement with both feet.

Standing up from seated, moving to the door and ringing the bell. During these activities the observer was looking for particular patterns of behaviour by the passenger. It was also noted *the door used to disembark*. It was coded if the passenger used the front or rear door to alight from the bus. The buses are designed such that passengers board at the front of the bus by the driver, and are required to exit at the rear door. However, at the outset of this study, and based on what participants of the focus groups study had said, it was known that some passengers alight from the bus using the rear door because they believe it is safer.

6.4.3.4 Independent Travel

It was observed whether a passenger was (1) ‘*travelling independently*’ (TI) which means the passenger was travelling on his/her own and completed the task without the help of a third person; (2) ‘*traveling accompanied independent*’ (TAI), the passenger was accompanied by other person, but did use the bus service without the help of a third person; (3) ‘*traveling accompanied dependent*’ (TAD), the passenger was accompanied and needed or received help to complete the task at any stage using the service. To record this behaviour the researcher first noted whether the passenger was travelling accompanied (Y/N), and then if he/she completed the tasks independently or needed any help from a third person to do so (Y/N). For this purpose ‘help’ was defined as any physical support provided by a third person, e.g. holding a hand when boarding or alighting, or supporting any part of the body for postural controlling. Additionally, it was observed and recorded whether passengers were *using a mobility aid* (Y/N).

6.4.3.5 Bus service characteristics and external factors

General notes were taken about *driving style, driver’s behaviour* (driving off before passengers were seated, parking too far from the kerb), *bus design* (steps shape and height, presence, location and height of handrails, seats layout, and bell position), *level of crowding on the buses*, and *how smooth or not the journey was*. These observations were done in a broad sense and the objective was to take notes about anything that would allow a better understanding of the behaviours of users. Other details were also noted when relevant, such as the general pavements and road conditions, bus stops (if any), and other road users’ behaviour.

6.4.4 Observational instruments

An A5 sized record sheet was used to record details for each observed passenger (see Appendix F). This sheet comprised a set of data fields based on the observation framework. There were spaces to record the duration of time taken to get on and off; a graphic of the seats layout in the bus; a section for general information (date, time, name of the observer, among others), and a section used to register general observations of each trip (e.g. comments regarding drivers or other passengers' behaviour). The record sheet was developed after having made an observation on the travel characteristics of the elderly using the public transport network in the UK (pre-test and pilot; see below), as well as using the previous experience about public transport in Guadalajara. Additionally, a stopwatch was used to measure the variable of time for boarding and alighting.

6.4.5 Ethics

Loughborough University ethical protocols were followed to undertake this study. In that sense, the LU ethical checklist (see Appendix B) was completed and sent to the Ethical Advisory Committee. It was determined that informed consent was not required from passengers, but it was considered important to request permission from the transport providers in order to undertake the observations on their buses. No transport provider rejected that request.

6.4.6 Pre-test and pilot

As part of the study preparation, and aiming to develop the observational framework a pre-test was undertaken. The pre-test consisted in a series of observational sessions using the public transport system in Leicestershire (Loughborough and Leicester), UK. The aim was twofold: to examine user's actions during the boarding, travelling and alighting stages, and to identify visual cues that indicate how aspects of the bus service had an impact on passengers' behaviour. A total of 38 bus passengers (12 younger and 26 older) were observed and notes were made. The analysis of these data was used to develop the observational framework and the record sheet.

In order to test the effectiveness of data collection instrument and to determine the number of people that could be observed at the same time a pilot test was carried out. With the pilot, the following adjustments were made to the instrument: 1) the use of an image containing the seat layout of the bus; 2) the inclusion of a section for general

notes. It was also decided that ideal number of people to observe could be three passengers at any one time, to maximise the quality of the data collected, but still ensuring an efficient data collection process.

6.4.7 Procedure

Observations were conducted on 17 different urban bus routes running between the north-western and the eastern outskirts of Guadalajara, crossing the city centre and hence having heavy passenger flow. A total of 49 observational sessions were undertaken, all on weekdays between 07.00 and 20.00 over a four-week period. The experimenter sat discreetly in the middle of the bus in order to have an overview of the entire bus, or on a few occasions at the back of the bus when there was a low level of occupancy (see Figure 6.2). The driver and passengers were unaware of the presence of the experimenter, or the existence of the study, but permission to undertake the study had been obtained from the head of the bus operator. (Note that buses were typically privately owned, even though there were organisations overseeing their operation.)

Passengers were observed and details taken as they boarded the bus; observations continued until they alighted. To ensure accurate data capture (especially when the buses were crowded), only three passengers at any one time were observed – as one passenger alighted, observation continued with the next older passenger that boarded the bus. In total, observations were made of 333 bus passengers (189 younger and 144 older); due to the crowded nature of the buses it was not possible to collect a full data set for each passenger observed – for example it was only possible to collect boarding times for 106 and alighting times for 124 of the 144 older passengers who were observed.

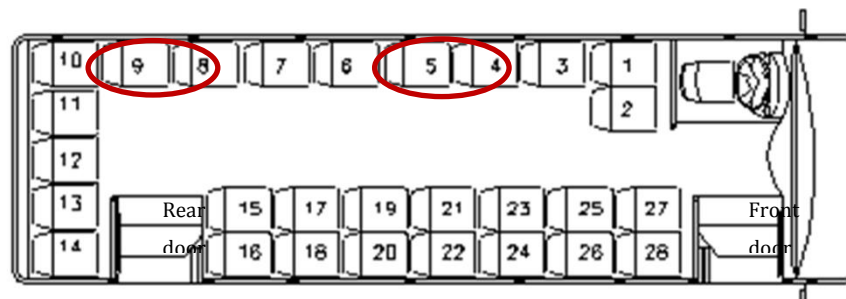


Figure 6.2 Typical bus layout, showing observer position (adapted from the Official Standard of the Secretary of Mobility - (Gobierno de Jalisco, 2005))

6.5 Results and discussion

This study aimed to investigate the relationship between the bus service characteristics and the behavioural differences between young and older passengers. The analysis and discussion of the results is divided in six sections; Section 6.5.1 describes some issues that occurred during the observational session; section 6.5.2 describes the data analysis; section 6.5.3 presents results related to the bus service, e.g. trip's characteristics, drivers' behaviours, and bus design. Sections 6.5.4 to 6.5.6 are regarding to the stages of getting on the bus, traveling, and getting off the bus. Section 6.5.7 is about whether passengers were travelling accompanied or not. Results are discussed in terms of how the current bus system characteristics prevent the ability to offer a safe, usable, and desirable service to the users.

6.5.1 Data collection issues

As the observations were undertaken within a real travel environment, there were some difficulties encountered when actually collecting the data; for instance, 1) when a bus was crowded and the observer was not able to be seated, observation data were not captured until it was possible to get a good seat to observe, for this reason most of the observations and notes were made when buses were semi-crowded or not crowded; and 2) some passengers were not observed during an entire journey due to the bus being too crowded to see the passenger clearly, or because the observer could not observe as several things happened at the same time (e.g. a passenger getting on by the front door and another one getting off by the back door). That situation happened less often with older people because most of them were using the front door to get on and off the bus.

6.5.2 Data analysis

The structure of a basic data file was set up on Excel for capturing data collected on the record sheet. Variables were defined and coded (see Table 6.2), and then data were imported and analysed using SPSS (v. 20). A process of screening and cleaning was undertaken before analysing data. The process consisted of a descriptive analysis for each categorical and continuous variable to spot possible errors. A few errors were spotted and corrected mostly related to categorical variables, e.g. a number two within variables coded with 0,1.

Table 6.2 Coded variables for the statistical analysis

Stage	Label	Variable name	Values	Measure
Any	Passenger Type	Passtype	0 = Younger 1 = Older	Nominal
	Gender	Gender	0 = Female 1 = Male	Nominal
Boarding	Use of handrails	Usehandrail	0 = No 1 = Yes	Nominal
	Loss of balance	BalanceLoss2	0 = No 1 = Yes	Nominal
	Time for boarding and moving to a seat	TimeGetOn	Time in seconds	Scale
	Driver drove off before passenger was seated	Drivoffearly	0 = No 1 = Yes	Scale
Travelling	Travelling seated or standing	TravSitorStand	0 = Standing 1 = Sitting	Nominal
	Seat location	SeatLocation	0 = Standing 1 = Front 2 = Middle 3 = Back	Nominal
	Using a priority seat	SitOnPriority	0 = No 1 = Yes	Nominal
Alighting	Used door to alight	UsedDoor	0 = Front 1 = Back	
	Time for standing up and alighting	TimeGetOff	Time in seconds	Scale
Any	Travelling alone	Travalone	0 = No 1 = Yes	Nominal
	Using a mobility aid	MobilAid	0 = No 1 = Yes	Nominal
	Passengers needed any help	AnyHelp	0 = No 1 = Yes	Nominal

In order to explore the nature of variables and possibilities to address the objectives of this study a descriptive analysis was undertaken to calculate frequencies for categorical variables. A posterior analysis using Chi-Square, with Yates correction to compensate the overestimation of the Chi-square value when used with a 2 by 2 table (Pallant, 2013), was undertaken to determine the significant differences in frequencies of occurrence among categorical variables. For the variables of ‘using a mobility aid’, and ‘passengers needed any help’ the Fisher’s Test was applied instead of Chi-square because the frequency in some cells was less than five (Pallant, 2013).

With the intention of applying some parametric statistics, the distribution of scores on continuous variables (time for boarding and alighting) for each group of passengers (younger and older) was tested in terms of normality and possible outliers. As suggested

by Osborne & Overbay (2004) the outliers were deleted from those variables to the extent of that the Kolmogorov-Smirnov test's result (that assess normality) was non-significant ($>.05$) (Pallant, 2013). Four data of older passengers were deleted from the time for boarding variable, while 11 and 18 data were deleted for younger and older passenger respectively for time for alighting. These data were from passengers that took longer to complete the activities.

Results from the Levene's test for equality the variances was significant ($<.05$), which suggested that variances of the two groups were not equal and therefore the assumption of homogeneity of variance was violated. However, as Stevens (2009:227) indicates, the F statistic is robust against heterogeneous variances when the group sizes are similar (largest/smallest <1.5).

Consequently, an independent-samples t-test was applied to compare the mean score on time for boarding and alighting variables for the younger and older age groups. Later, a two-way analysis of variance was used to investigate the joint effects of seat location and age groups on boarding and alighting times.

6.5.3 Observations on the bus service

6.5.3.1 Bus design

This section describes observations made relating to aspects of the bus design that appeared to influence passengers' behaviour. The following features were observed during the study: exterior appearance and types of buses running in the city, type of transmission and suspension, interior and seats layout, design of the stairs on entrance and exit, presences of handrails, and bell location.

Although there are five or six different kind of buses operating in the city, all of them shared similar characteristics. For example, they are single deck buses built on a truck chassis; therefore the height of the interior flooring is about 1.10 meters, thus all of them have steps to enter and exit of the bus. According to data reported by local authorities (El Informador, 2011), there are only 10 low entry buses among the more than five thousands buses in the city. The main differences are the bus length and number of seats, and the engine position. The bus length might be from 8.4m with 28 seats to 11.2m with a total of 44 seats. The engine position can be in the front or in the rear of the bus. The largest percentage of buses has the shorter length with the engine

placed in the front. All 47 observational sessions were undertaken aboard this kind of bus, and two sessions were on larger buses. Figure 6.3 shows some examples of the external appearance of those buses, which are technically called '*midibus boxer*'. According to the official standard (Gobierno de Jalisco, 2005) the bus capacity is for 28 seated passengers and 58 traveling standing.



Figure 6.3 The external appearance of the most common buses in the city

The suspension of the buses seemed very inflexible. Perhaps as part of being built on truck chassis, the transmission is not appropriate to carry passengers. This characteristic caused more instability on passengers travelling standing. Another characteristic of the bus design was that all of them – except the low entry bus - were built with manual transmission, which increased the workload of the drivers and the instances of rapid acceleration and deceleration.

All the buses had steps on the entry and exit. The official standards stipulate that the height of the first step is not more than 40 centimetres, and the rest of steps varied from 23 to 28 centimetres. It was most common to find buses with four steps, though there were a few of them with only three. It was observed that there were some design differences in the steps, which varied according to the doors design and engine position. It was observed a couple of buses with the stairs in bend shape (see Figure 6.4); however, the most typical design was a straight flight with four steps.



Figure 6.4 Examples of different steps on the bus entrances

The most common seats layout of the buses is shown in Figure 6.5. This type of bus had 28 seats along both sides of the bus. On the left of the bus there is a line of single seats, in contrast with right side, which has two lines of seats. This layout is to allow a higher number of standing passengers. There were some buses with double line of seats on each side of the bus, but most of the observations were undertaken on buses with a layout similar to Figure 6.5.

It was observed that the seats one, two, and three were priority seats. This kind of seat is reserved if needed for pregnant women, disabled and older people, and those seats were in a yellow colour, while the rest were blue. From the figure it can be observed that the buses have two doors. It is intended that the front door should be used for getting on, and passengers should alight using the back door. This action was indicated by a sign on the top of the front door, which stated that ‘passengers should get off using the back door’.

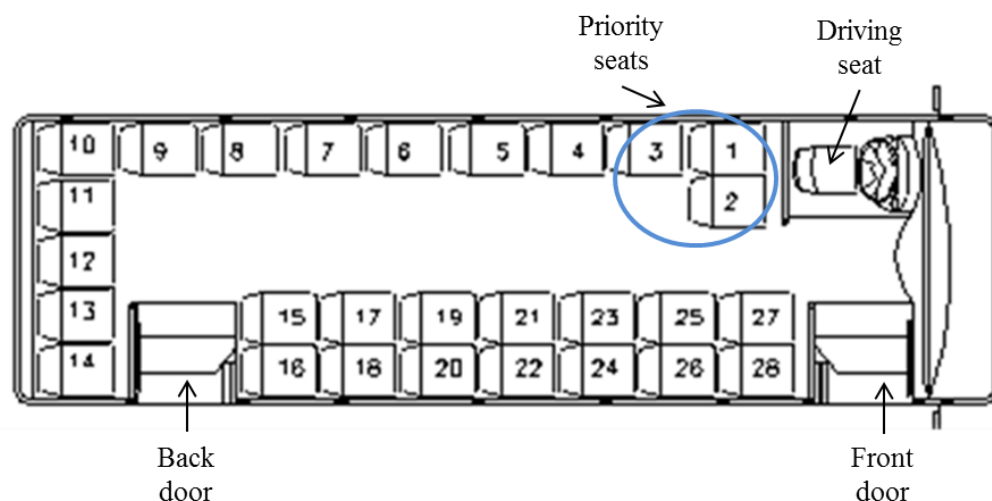


Figure 6.5 The seats layout of the most common bus during the observations

Other observed features were the handrails and the bells. The handrails were placed horizontally on both sides of the bus gangway at a height of approximately of 175 centimetres. There were vertical handrails only near to the front and back door. Most of the buses had a single bell placed on the vertical handrail close to the back door at a height of approximately of 170 centimetres. It was observed only one bus with a bell located in front of the bus close to the priority seats.

6.5.3.2 Characterisation of the observed journeys

Results related to the bus service characteristics allowed identification of the elements of the bus service that impose difficulties for passengers or might prevent use of the service for current or potential users. Likewise those findings might help to understand and discuss the observed differences in the patterns of behaviour among young and older passengers. Two different characteristics were observed and noted of the trips: crowded buses and unsteady trips.

Crowded buses

Crowded buses were common during the observational sessions. Although it depended on the time of the day (e.g. mornings between 7.00 to 9.30, afternoon from 12.30 to 14.30, and evenings from 17.00 to 19.00), buses were also overcrowded when they were near to an important area of the city as the city centre, hospitals, governmental offices, markets, among others.

These results suggest that crowded buses are common in the bus system of Guadalajara, Mexico. These findings support those of the previous study (Chapter 5) in which participants reported crowded buses as a frequent condition of the service. Additionally, results also reinforce those by the World Health Organization (2007), who stated that crowded buses are typical in developing countries. Such a characteristic of bus service prevented some passengers from boarding the bus, and imposed more difficulties for using the service. Some studies have associated crowded buses with problems using the bus service (Carlsson, 2004; Coughlin, 2001; Katz & Garrow, 2012), as well as with safety issues (Katz & Garrow, 2012; WHO, 2007), and lack of comfort (Howarth et al., 2011; Katz & Rahman, 2010).

Crowded buses had an effect on passengers' behaviour. For instance, an obvious behaviour was that most of the passengers were standing, and many of them remained near to the doors. This situation made it more difficult for passengers getting on or off

because they needed to push through the people at the doors. Sometimes it was observed that the drivers asked passengers traveling near to the front door to ‘please go to the rear’. It was also more difficult for passengers moving through the bus.

Another behaviour pattern was that passengers preferred to use the aisle seats instead of seats close to the windows. It appears that the passengers avoid window seats because it is more difficult to get out of seats due to the small space between each seat. Therefore, occasionally there were some window seats that were not used, even when the bus was crowded with lots of passengers traveling standing.

Smooth and unstable journeys

Since the road surface was mixed, with some areas being recently re-surfaced, but the majority of roads were in poor condition. Overall it was recorded that of the journeys relating to the observed passengers, only 14% of them were considered as ‘smooth’ journeys over their entirety. The remaining journeys had at least some sections of bus instability, and of these, approximately 60% had frequent and extended sections where passenger instability was observed.

The stability of a journey is not a characteristic frequently reported as barrier to using the bus service. However, previous studies have explored the use of buses through self-report methods (see Broome et al., 2009) or laboratory experiments (see Karekla & Tyler, 2012) which do not allow observing the real life situation. Furthermore, most of the reported studies have been undertaken in developed countries where buses and/or road conditions are likely to be different to those in developing countries.

The stability of a journey depends on acceleration or deceleration, which is determined mainly by the driver’s driving skills (Karekla & Tyler, 2012). However, it should be noted that stability might be also affected by the bus design (e.g. manual transmission and rigid suspension), the road surface conditions (uneven roads or containing potholes), other drivers’ behaviour, and high density of traffic, among others. For instance, there are no bus lanes in the city of Guadalajara, therefore, bus drivers have to maintain (sometimes to fight for) a place in the traffic, which is not always free of incidents with other drivers. Under these circumstances there were times when the bus drivers had to brake sharply, or make sudden manoeuvres to avoid collision with other vehicles.

However, irrespective of the cause of unstable journeys, this condition has an impact on passengers' experience and behaviour. According to Levis (1978) comfort, stability and safety of all bus passengers is affected by the acceleration conditions in the vehicle. The impact of unstable journeys on passengers will be discussed more in Section 6.5.4.3 .

6.5.3.3 Drivers' behaviours

There were some patterns of behaviour relating to driving style which were displayed by most of the drivers during the observational sessions. For example, it was observed in at least 50% of the trips that the driving style employed included frequent acceleration and deceleration and sharp braking. This was exacerbated by the frequent gear changes required with the manual gear boxes and the suspension design of the converted truck chasses. The road conditions were often poor and drivers generally observed a lack of caution when passing over speed bumps or potholes. The actions of the drivers indicated they were driving under time pressure. In only approximately 10% of cases drivers were observed to be driving more cautiously.

It appeared that drivers had a high workload. For instance, when passengers were getting on the bus, the drivers had to complete the following multiple actions: stop the bus, press the button to open the door, drive off once passenger was inside the bus, gain space in the traffic, take money from the passenger, change the gears, select coins for change, and give the change and ticket to the passenger.

It was frequently observed that the drivers did not stop near to the kerb. It was very rare to observe cases when the driver stopped the bus close to the kerb. A large distance between the kerb and the bus step made it more difficult for passengers, especially for older ones, boarding or leaving the bus because they had to board from the road level. This problem was also observed by Petzäll (1993), and it has been reported as a barrier to use the bus service by older people (Peel et al., 2002; WHO, 2007). However, this was not always the decision of the driver, due to passengers waiting in the road, a lack of official bus stops or even pavements, and cars parked at or near to the bus stops which made it impossible to stop the bus adjacent to the pavement.

Another pattern of behaviour exhibited by the drivers was allowing only a short time for passengers to get on or off the bus. Sometimes it was observed that the drivers only slowed down (and did not actually stop) to allow passengers to get on or off. Therefore, in those cases passengers were forced to 'jump' on or off the bus. Also, it was not

uncommon to see some drivers pressurising the passengers to board or leave the bus quickly. Similarly, it was observed that some drivers did not stop at all at bus stops to collect passengers or to allow them to alight. These behaviours were mainly displayed when the bus was crowded or during periods when it appeared that the driver was rushing under time pressure. These situations are consistent with those expressed by participants on the focus groups study described in Chapter 5.

Consistently, it was found that the drivers drove off before passengers were seated. In fact, the most common action was that the drivers drove off as soon as the passengers were on the first step, and even before they had made any payment to the driver. Figure 6.6 illustrates that in 88% of the observations, the drivers departed before the passenger had taken a seat or moved to their standing position. The remaining percentage represents situations in which passengers boarded at a bus stop located in a junction controlled by traffic lights which were at red, or when there were more passengers boarding and therefore the driver had to wait for these following passengers before driving off. Also it was noted that some older people tended to use a bus stop at which there was a traffic light, which could be a strategy employed to have a little more time before the driver drive off. On very rare occasions (approximately 2%), it was observed that the driver waited for a passenger to be seated before driving off.

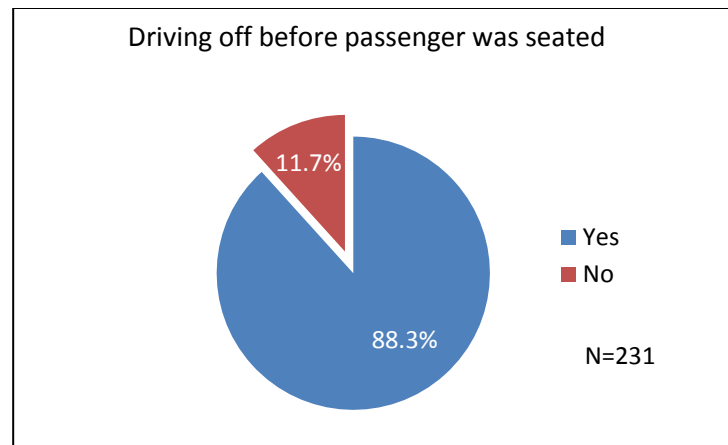


Figure 6.6 Percentage of times that drivers drove off before passenger were seated

These findings support those of the previous study (Chapter 5) in which participants reported that drivers never wait until passengers are seated. Also, these results reinforce those by some other authors, including Nickpour et al. (2012), who found that driving away before passengers are seated was reported as barrier to using the bus service in London. As well as making it difficult for boarding, paying, and moving to a seat, this

situation raised a safety issue because passengers, particularly older ones, were more likely to lose their balance and eventually fall. This situation is described by Age UK (2009) who reports that there are more than 800 falls on buses every day in the UK by people over 65 years old.

Drivers also showed a tendency to pick up as many passengers as possible in the bus. This behaviour was observed even in situations when there were already many passengers in the bus. It appeared that some drivers were competing against others to collect more passengers. In three occasions, it was noted that the bus drivers were discussing the number of sold tickets over the day.

These drivers' behaviour might be explained by the lack of a regulatory and legislative regime in the city, where the existence of "informal" systems of buses allow results in drivers being paid directly out of the fares they collect, and therefore a 'race' to pick up passengers (Access Exchange International, 2009). Bus operators therefore compete instead of collaborating to provide an inclusive service to users and society (Gutiérrez-Pulido et al., 2011). Similar conditions have been reported in cities like Dhaka, Bangladesh (Katz & Garrow, 2012).

Some other behaviours were observed with less frequency and were exhibited by only a few drivers. For example, a few of them never looked towards the passengers, received the payment or presented the ticket rudely to the passenger. Unfriendly drivers have been reported as a barrier to using the bus service by older people (Broome et al., 2010; WHO, 2007). It was also noted that some drivers did not allow passengers to alight using the front door. It was also observed that few drivers exhibited some unexpected behaviour, e.g. smoking, eating, using a mobile, or listening to music.

6.5.4 Journey Stage 1: Boarding the bus

This stage includes the tasks of boarding the bus, paying the bus driver, and moving to a seat or standing position. According to the observations, though all passengers performed the same tasks, young and older passengers showed different patterns of behaviour. The main observed differences were related to the way passengers climbed the stairs, postural control and use of handrails, and the time to board and move to a seat/standing position.

6.5.4.1 Climbing the stairs

The process of boarding the bus started with the climbing of the steps of the bus. All the observed passengers were able to complete this task. It was observed that the pattern of behaviour was determined according to the sort of passenger, number and height of steps, and whether the passenger was starting from the level of the road or from a raised pavement. It was noted that the older passengers had more difficulties climbing the stairs than the younger passengers. Many of the older passengers climbed the stairs placing both feet on each stair. In comparison, young passengers rarely exhibited that behaviour.

These results may be explained by the fact that climbing up and down stairs (stair negotiation) are among the most challenging and hazardous types of locomotion for daily living for older people. Climbing up and down stairs are high demand tasks (Redfern et al., 2001) for the musculoskeletal and cardiovascular systems, which in turn require information from the somatosensory, visual, and vestibular systems to complete the task (Startzell & Owens, 2000). Meanwhile the ageing process is characterised by a reduction on the function of those systems (Rogers et al., 1998), therefore a gap is produced between the task demands and the older user capability. For example, the reported ranges of motion of the lower extremity joints which are necessary for climbing up and down stairs may be at the limits of what many older people can achieve due to changes in joint mobility (Startzell & Owens, 2000). This situation might help to understand why many older people ascended or descended through placing both feet on each step.

The degree of challenge of stair negotiation might vary due to structural and environmental factors, e.g. the height of the steps, the existence of handrails, or the level of illumination. In the present study, it was observed that the number, shape, and height of the steps on buses, particularly of the first one, seemed to be a problem for most of older passengers, and even so for young short people. It was noticed that some passengers had to make considerable effort to climb that the first step in particular, which is consistent with findings reported in a previous study (Petzäll, 1993). This problem was exacerbated because drivers generally did not stop close to the kerb and passengers had to board from the road level. Thus, the height of the first step, from road level was commonly 400 mm, which is above of the recommended dimensions of 150-

200 mm (Petzäll, 1993). Such situation was compounded by the fact that the drivers allowed little time for passengers boarding or alighting.

This situation has important implications for using the bus service. On the one hand, it imposes usability problems on passengers, particularly for older ones. Not surprisingly difficulties boarding and alighting buses have been widely reported as a barrier to using the bus service (see Broome et al., 2009). On the other hand, climbing the stairs under time pressure increases the risk of falling. This corroborates those results of the focus groups study (Chapter 5), in which 37 out of 43 participants (65% of young and 100% of older participants) expressed concerns about safety issues. Beyond safety concerns, 42% of older participants in the previous study reported having had an accident whilst using the bus service. These findings are also in line with those by Kirk et al. (2003) who found that of all killed or seriously injured passengers in non-collision incidents on buses or coaches in Great Britain, 26.6% were injured whilst boarding or alighting.

Given the high demand and the hazards of stair negotiation for older adults, it often requires the adoption of compensatory strategies such as increased handrail use to mitigate disability and increase stability (Reid, Novak, Brouwer, & Costigan, 2011). In this observational study, it was detected several times that older passengers did support themselves by pulling up with the handrails in order to be able to overcome the height of the steps, particularly the first one, and to control their posture. The differences between young and older passengers in relation to using handrails and balance loss are presented and discussed below.

6.5.4.2 Grasping the handrails

Stair negotiation might be supported by the use of a handrail. According to Startzell & Owens (2000) a handrail enables the user to slide their hand to monitor progress, it can be used as a means of reducing the load on the lower extremities, and it also helps as a device to prevent falls after a misstep or slip. Handrails have been also described as a multipurpose tool that provides both physical and psychological support (Reid et al., 2011).

Figure 6.7 shows the differences in percentages of young and older people who used handrails whilst getting on the bus. It can be seen that practically all older people (99.3%) grasped the handrails. In comparison a lower percentage of young passengers (78.2%) used this support. A Chi-square for independence (with Yates Continuity

Correction) was conducted in order to determine whether there was a significant difference in the use of the handrails by young and older people. Older passengers were significantly more likely to use the handrails when boarding the bus and moving to a seat than younger people, $\chi^2(1, n=328) = 30.53, p < 0.001, \phi = .31$.

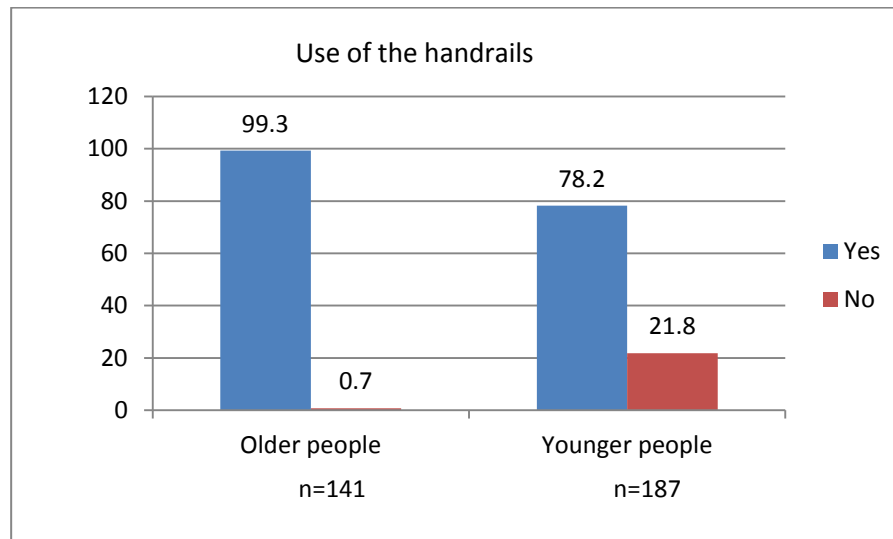


Figure 6.7 Percentage of young and older people who used the handrails

Aside from a single older passenger, who seemed physically well and boarded the bus when bus was stopped in a traffic light, all the older passengers grabbed the handrails whilst boarding, paying, and moving to their seat. Surprisingly, a high percentage of young users were also using the handrails, however, it was observed that most of the older passengers used the handrails either to support themselves when climbing up and down the stairs, or as a support for keeping their balance while they were paying or moving to a seat. The majority of older people used both hands when possible to grab ‘strongly’ the handrails. In comparison, most of young passengers used the handrails as a general support with only one hand sliding along them. Nevertheless, sometimes even some of the younger passengers needed more strength and both hands to grab the handrails, especially when the driver had driven off sharply and passengers were paying or moving to a seat.

These findings are not entirely consistent with Hwangbo et al. (2012) since they observed that most of the able-bodied able passengers did not support themselves with additional support equipment when boarding the bus. In that study, only some female and female mobility-disabled passengers used the door handles located in the front door. However, the study of Hwangbo et al. aimed to observe passengers’ behaviour

travelling in a low-floor bus. In addition, they did not report that passengers were under time pressure or that drivers were driving off before passengers were seated. In contrast, findings from this study in Guadalajara *are* consistent with those by Petzäll (1993), who observed that the group of slightly ambulant disabled people, representative of ordinary older people, needed to use the handrail to board and alight buses with steps.

The use of handrails by older passengers in this study might have at least two explanations. Firstly, as stated above, older people use the handrails as a means of reducing the load on the legs when climbing up and down steps. Secondly, this behaviour might also indicate that passengers were using a proactive control mechanism (Redfern et al., 2001) to avoid losing their balance, and potentially falling. Previous studies have found that older adults with decreased confidence and high levels of fear of falling took greater precautions when negotiating the stairs, such as increasing the degree of handrail use (Hamel & Cavanagh, 2004; Tiedemann, Sherrington, & Lord, 2007). This handrail use enhances dynamic stability, particularly during stair descent (Reid et al., 2011).

Hence, it could be concluded that older passengers in this study, who used the bus service, could have experienced fear of falling. Such kind of conclusion is consistent with the result of the previous study (Chapter 5), in which all the older participants expressed safety concerns and fear of falling whilst using the bus service. This conclusion would be also consistent with the current literature which indicates that older passengers have manifested safety concerns (Broome et al., 2009), and with studies that have reported an increased risk of falling during stair negotiation (Buckley, Heasley, Twigg, & Elliott, 2005).

6.5.4.3 Losing balance

According to the observations, passengers from both age groups lost their balance when they were at the stage of getting on the bus. The loss of balance mainly happened when passengers were paying the driver or when moving to a seat. It was observed that passengers had trouble taking cash from their wallets or purses, paying the driver, and grasping the handrails and their belongings at the same time. Indeed, some older passengers exhibited alternative behaviours such as placing their belongings at the floor while they were paying or moving to the nearest seat, putting down their belongings and once seated then paying the driver. However, the main cause for passengers losing

their balance was the fact that drivers drove off before passengers were seated. Maintaining postural control in those conditions seemed to be a major problem for passengers, especially for older ones.

Figure 6.8 illustrates the percentage of young and older passengers who lost their balance, as defined in Section 6.4.3.1 . A Chi-square for independence (with Yates Continuity Correction) was conducted in order to determine whether there was a significant difference in this behaviour between these groups of passengers. Older passengers were significantly more likely to lose their balance whilst boarding and moving to their seat (56.1%) than younger people (34.8%), $\chi^2(1, n=238) = 10.03, p = 0.002, \phi = .21$.

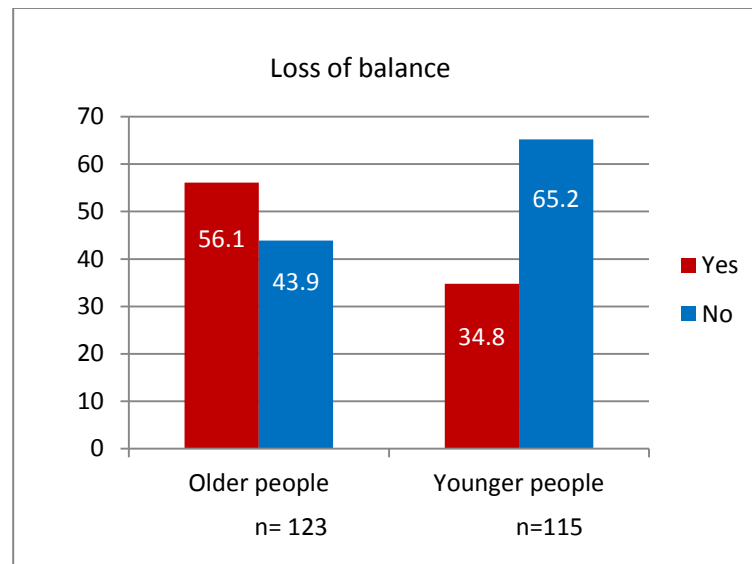


Figure 6.8 Percentage of young and older people who lost their balance

This difference can be explained by the fact that older individuals are less stable during standing, and do not perform as well as young people on obstacle clearance, postural perturbation or other motor control tasks (see Maki & McIlroy, 1996; Startzell & Owens, 2000). The acceleration and deceleration of the bus, which was exacerbated by the frequent gear changes required with the manual gear boxes, played a key role in disturbing postural control of standing passengers and those moving to a seat. Such forces acting on the passengers oblige them to react using compensatory movements like altering their posture, and therefore centre of gravity; and reacting through grasping the handrails. Unfortunately, these means of compensation might not be available for all older passengers, especially those with limited strength, who might not be able to react

to the imposed force by the acceleration environment (Brooks, Edwards, Fraser, & Levis, 1978; Levis, 1978).

Some of the issues to do with this finding relate specifically to the quality of the bus service and the impact on the bus passenger experience. The implications for passenger safety are evident, particularly for older people, since it has been widely reported how problems with posture control might lead to a fall (Redfern et al., 2001). As it was pointed out above, older people are more susceptible to falls, which seems to be consistent with the literature of non-collision injuries in public buses (Halpern et al., 2005; Kirk et al., 2003). Such situation may increase because more and more old people will need to use the bus service in the near future.

6.5.4.4 Time to board and move to a seat

Overall data analysis showed that older people boarded the bus and moved to a seat more slowly than young passengers. Figure 6.9 shows a frequency distribution of the boarding time as defined in Section 6.4.3.1 . It can be seen that the typical time for boarding was between nine and 20 seconds for younger passengers. In comparison, the typical time to complete this task was between 10 and 35 seconds for older passengers, although there were instance of much longer durations among these passengers as a result of the difficulty passengers faced in moving through a moving bus in order to take a seat.

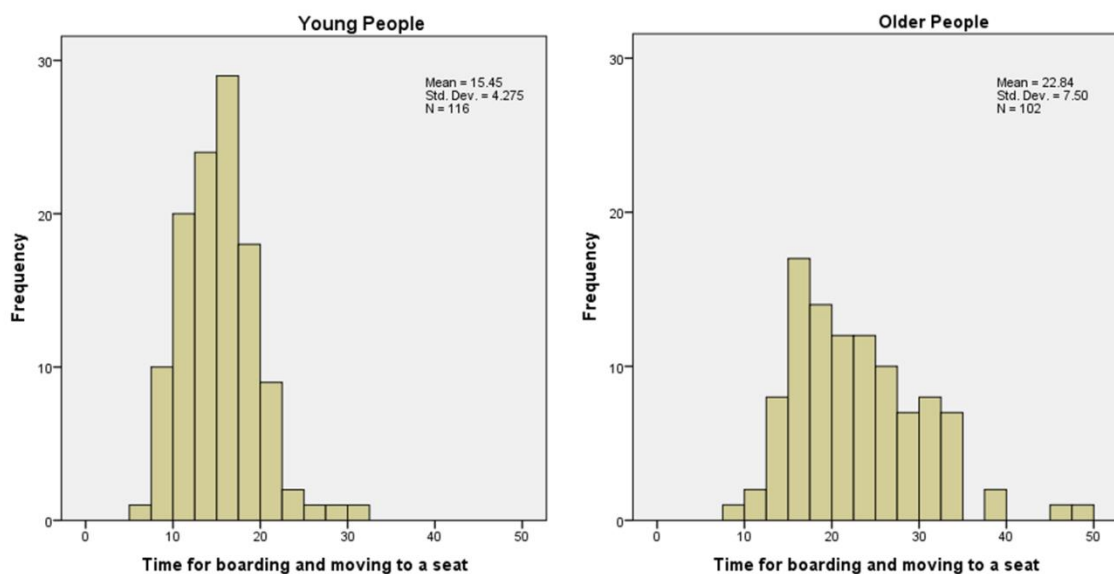


Figure 6.9 Distribution of boarding times for younger and older passengers

Differences in boarding time between younger and older passengers

An independent-samples t-test was conducted to compare the time to board and move to a seat for young and older people. There was a significant difference in the time for younger people ($M = 15.4$, $SD = 4.27$) and older people ($M = 22.8$, $SD = 7.5$; $t(155.78) = -8.78$, $p < .001$, two tailed). The magnitude of the differences in the means (mean difference = -7.39 , 95% CI: -9.05 to -5.73) was very large (eta squared = $.26$).

An initial comparison of the distribution of scores on time for boarding and seat location for younger and older people suggested that for every location, older passengers were slower (see Figure 6.10); and that even the slowest group of younger passengers (rear) were quicker than the fastest older passenger group (front seats). An independent-samples t-test showed a significant difference in boarding time for those younger people seated at the rear region ($M = 16.8$, $SD = 3.82$) and older people seated at the front ($M = 21.0$, $SD = 6.62$; $t(97.9) = -4.06$, $p < .001$, two tailed). The magnitude of the differences in the means (mean difference = -4.25 , 95% CI: -6.32 to -2.17) was very large (eta squared = $.15$).

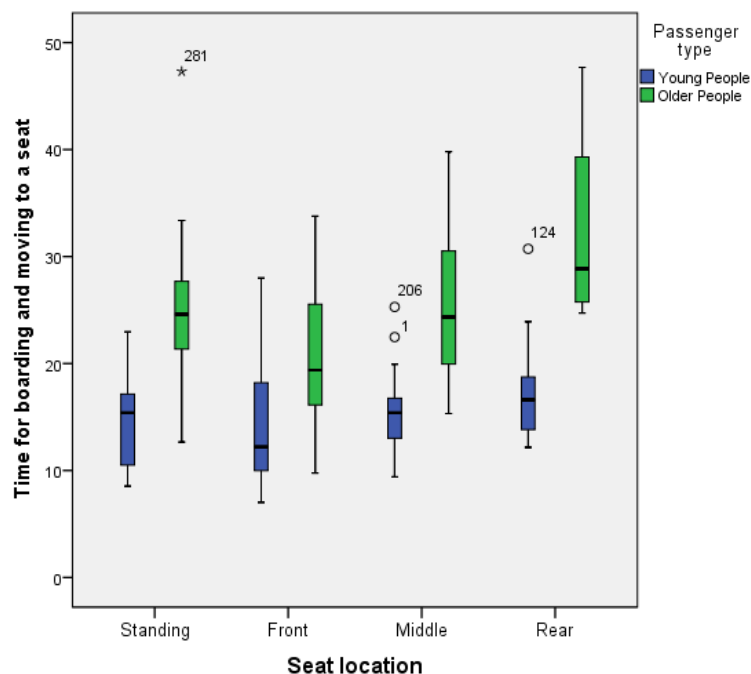


Figure 6.10 Time for boarding according to the region inside the bus where they were traveling

The effects of seat location and age group on boarding time

To eliminate the confound of seating position, a further Two-way analysis of variance was calculated to analyse the effects that the seat location (standing, front, middle, back) and type of passengers (younger and older) had on the time for boarding the bus.

Results showed that there was no significant difference ($F(3, 210) = 2.60, p = .53$) in the effect of seat location on boarding time for younger and older people. There was a main effect of passenger type ($F(1, 210) = 102.97, p = .001$) and seat location ($F(1, 210) = 6.73, p = .001$).

Even though the interaction effect between type of passenger and seat location was not statistically significant, Figure 6.11 shows a trend for a greater effect of seat location on time for boarding for older passengers. It can be seen that the mean difference for younger passengers seated in front ($M = 14.2$) and back ($M = 16.8$) is 2.6 seconds. In contrast, for older passengers in front (24.5) and back (32.5) the difference was eight seconds, three times higher than for younger passengers.

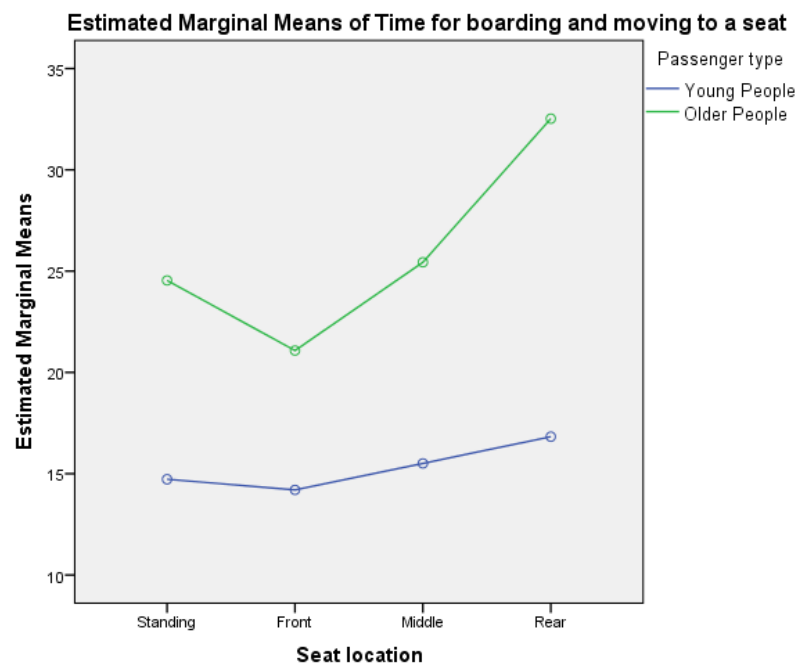


Figure 6.11 Interaction of passenger type, seat location and boarding time

These differences in time for boarding between younger and older people might be explained by the fact that each group of passengers possesses different abilities. As discussed above, given a decline in functionality in the ageing process (normal or pathological), older people could exhibit slower movements. Previous research has

suggested that older people with blurred vision (Buckley et al., 2005), fear of falling (Reid et al., 2011; Tiedemann et al., 2007), or decreased confidence in stair negotiation (Hamel & Cavanagh, 2004) are more likely to ascend and descend stair with slower speed than their young counterparts. In a study with ambulant disabled persons using buses, Petzäll (1993) found that time for boarding and alighting was related to the subjects' type and degree of impairments. Given the actual bus service features (stepping from the road level, steps height, handrails design, move to a seat when bus is moving, among others), older passengers might be forced to execute movements more cautiously and therefore take longer for boarding.

Although, there is a lack of published work based on real world observations, these findings are partially consistent with those by Petzäll (1993) who found that the times for boarding and alighting were dependent on the ability of the subjects, but also on the height from the ground to the floor of the bus. In the study of Buckley et al. (2005), results suggest that time to step up and down increased with increases in step height.

The fact that older passengers get on and move to a seat more slowly than the younger passengers has little effect on the bus service because drivers drive off before passengers are seated. However, this situation may have a major effect on older passengers because the longer they take to get to a seat, the greater the time that they are exposed to the risk of losing their balance and possibly suffering a fall. Older people are particularly vulnerable to non-collision bus injuries (Palacio et al., 2009). This implication seems to be consistent with the reports of participants, particularly older ones, in the focus groups study (chapter 5) who expressed their perception of being at risk due to aspects of the bus design and bus driver's behaviour.

6.5.5 Journey Stage 2: Traveling

Younger and older passengers showed similar patterns of behaviour during the travelling stage, but there were also some differences. Next subsections present and discuss the main patterns of behaviour among younger and older passengers at this stage. In general, patterns of behaviour tended to be different when the bus was crowded or when the trip was very unstable.

6.5.5.1 Traveling standing or seated

Although, observational sessions were made when the buses were not overcrowded, there were some moments which were possible to observe younger and older passengers traveling standing. The lack of available seats was the main reason to travel standing. Figure 6.12 illustrates the percentage of young and older passengers who were traveling standing or seated. It was expected that there would be a lower percentage of older passengers traveling standing, but the percentages were actually very similar. A Chi-square for independence (with Yates Continuity Correction) indicated no significant difference between age group and traveling standing or seated, $\chi^2(1, n=333) = .56, p = .45, \phi = .049$.

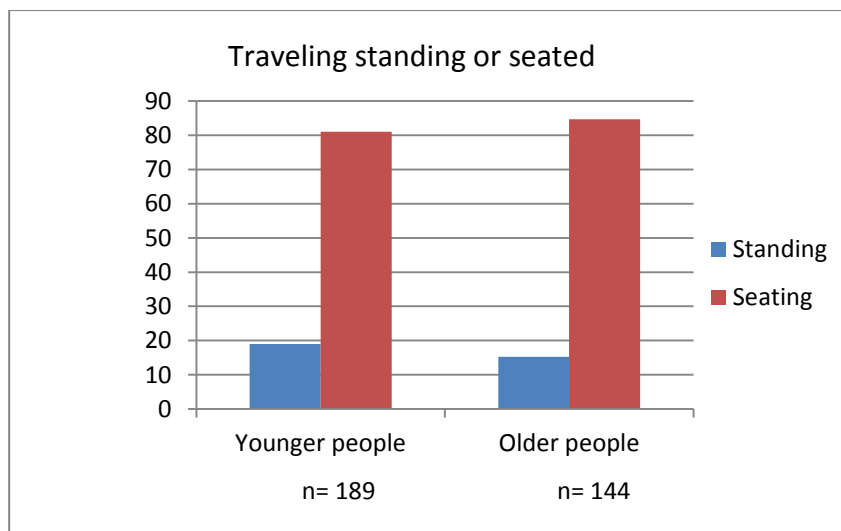


Figure 6.12 Percentage of young and older people traveling standing or seated

Passengers traveling standing showed different patterns of behaviour than those travelling seated. For instance, it was evident that most of them were looking for a seat. This behaviour was more common among older people, who tried to get a seat as soon as one was free. Moreover, since the effect of acceleration and deceleration was higher on standing passengers, they had to hold the handrails tightly to avoid losing their balance. Consequently, traveling standing had serious implications for passengers' safety.

6.5.5.2 Using a priority seat

Figure 6.13 shows the percentage of young and older passengers who used a priority seat. As was expected, a higher percentage of older passengers used a priority seat. In contrast, only 5% of young passengers, who were observed, exhibited that behaviour.

A Chi-square for independence (with Yates Continuity Correction) indicated a significant difference in this behaviour between these groups of passengers, $\chi^2(1, n=333) = 78.28, p = 0.001, phi = .49$.

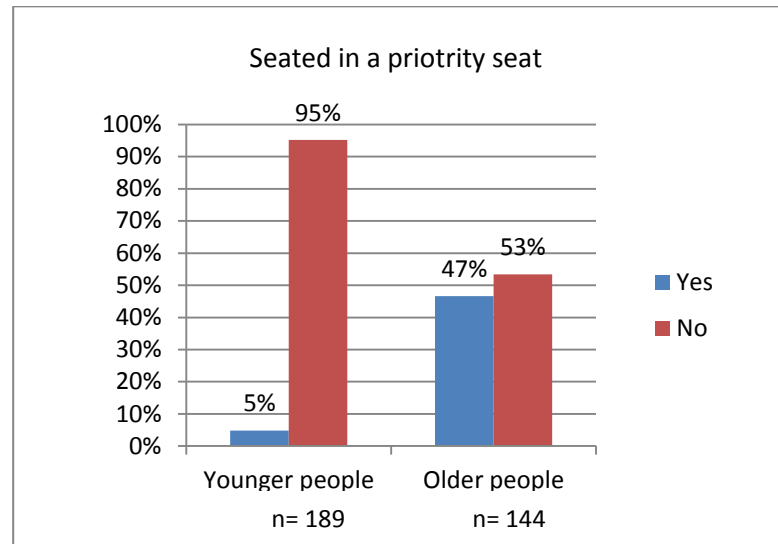


Figure 6.13 Percentage of young and older people seated on a priority seat

Beyond those differences among younger and older passengers, it was observed that younger passengers generally did not take a priority seat when there were additional seats available; however, when buses were crowded younger passengers tended to use those seats more, even when some older passengers were getting on or traveling standing. Figure 6.14 shows that on 35% of occasions that an older person was getting on the bus, at least one of the three priority seats was occupied by a younger passenger. On very few occasions it was observed that a younger passenger, who was seated in a priority seat, gave up the seat to an older passenger. This finding corroborates the views expressed by older participants in the focus groups (Chapter 5), who stated that young passengers often used the priority seats.

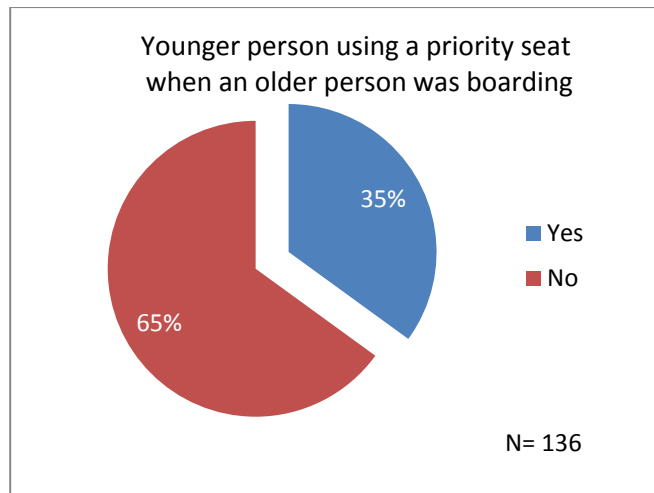


Figure 6.14 Percentage of times that a younger passenger was using a priority seat at the time that an older person was getting on the bus

It was also interesting to observe that older passengers did not always sit on a priority seat even when these seats were free. Older people also used to sit on priority seats located at the aisle. Then it was difficult to enter and use the window seat due to a narrow space between the seat and the board behind the driver, and consequently several times nobody chose to sit there. These findings are consistent with those by Petzäll (1993) who found that a short distance between seats makes it difficult to rise because the person cannot stand straight upright. Difficulties getting in and out of seats have been reported as barriers to using the bus service for older people (Broome et al., 2009; Carlsson, 2004).

6.5.5.3 Chosen seat or place to travel

Differences were also observed related to the region within the bus where young and older passengers chose to sit. For this analysis the areas in the bus were divided into front, middle and back, plus those traveling standing. Figure 6.15 shows the percentage of young and older passengers who were seated or traveling in each of those areas. A Chi-square for independence was conducted in order to determine whether there was a significant difference in this behaviour. Older passengers were significantly more likely to use the front area (69%) than younger people (19.6%), who were mostly traveling in the middle and/or in the back, $\chi^2(3, n=333) = 70.45, p = 0.001, phi = .46$.

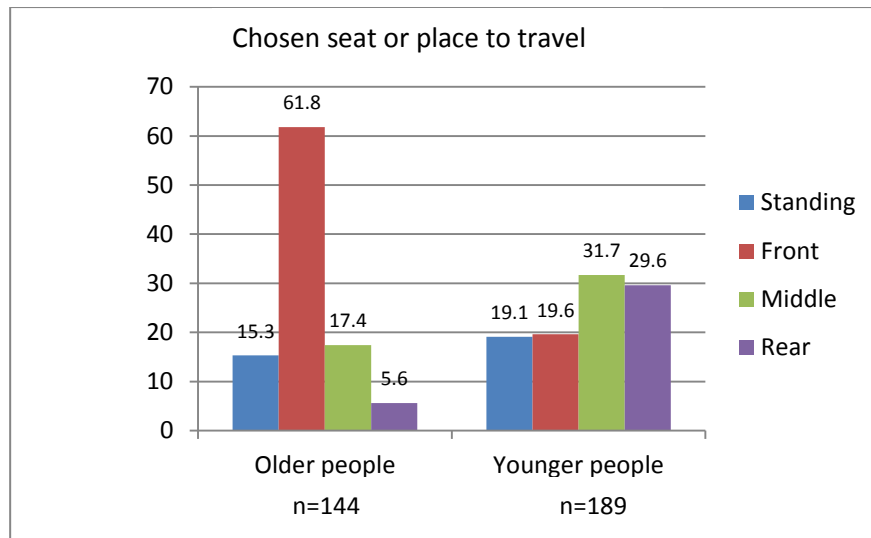


Figure 6.15 Percentages of young and older passengers according to the chosen seat or place to travel

It appeared that there were three reasons that encouraged older people to sit in the front of the bus. First, the priority seats are in that area; second, most of older passengers tried to get a seat as soon as was possible (frequently a free seat was in the front); and finally, it was evident that this group of passengers were trying to position themselves as close as possible to the front door. Several times it was observed that some older passengers (who were seated further back) tended to move towards another seat nearer to the front door. These results are partially consistent with Hwangbo et al. (2012) who observed that mobility-disabled females tended to use seats in the front space of the bus. However, these authors do not report why those passengers used the front space for travelling.

6.5.6 Journey Stage 3: Alighting the bus

This stage includes the tasks of standing up from the seat, moving to the door, ringing the bell (or asking the driver to stop), and getting off the bus. The main observed differences were related to passengers moving to the doors, the preferred door to alight from, the way the steps were descended, and the time taken to get off.

6.5.6.1 Standing up from seated, moving to the door and ringing the bell

In the process from standing up and moving to the door the most common pattern of behaviour was that all passengers who wished to alight had to stand up before the bus had stopped. This behaviour might be explained by there being only one bell in the bus near to the rear door; therefore, passengers had to move to the rear door and ring the

bell before they had reached the bus stop. It was observed that some passengers had problems pressing the bell due its position. In the case of a passenger wishing to alight using the front door it was necessary to be close to the driver and ask him to stop. In a previous study, Hwangbo et al. (2012) report that passengers were observed to have difficulties finding and pressing the bell in order to signal for the bus to stop.

When the bus was crowded it was difficult for passengers to move through the bus and reach the bell and doors. On several occasions it was noted that passengers who were trying to get off the bus had to ask somebody else to ring the bell for them. In the case of passengers who were trying to reach the front door, they had to shout or speak loudly in order to attract the driver's attention. These findings are consistent with those of the focus groups study (Chapter 5) in which participants pointed out that when buses are crowded it is extremely difficult to move through the bus. Crowded buses have been related to difficulties in using the bus service by older people (Carlsson, 2004; Coughlin, 2001), and with operation problems for the bus service (Katz & Garrow, 2012).

According to the observations undertaken in this study, younger and older people showed some differences moving towards the door prior to alighting. For example, older people stood up and moved to the door early, in preparation for alighting. In fact, it was observed that many of them stood up at the previous bus stop, when the bus was stationary, in order to walk through the bus and reach the bell or to ask the driver to stop. As it has been discussed before, older passengers were actively using strategies to minimise the risk of losing balance and potentially falling.

6.5.6.2 Preferred door to alight

Another difference among younger and older passengers was related to the door that they used to alight from the bus. Figure 6.16 shows the percentage of young and older people who used the front or rear door for getting off the bus. It can be seen that most of older people (70.7%) chose to get off by the front door. Conversely, the majority of young people (81%) did get off the bus using the rear door. A Chi-square for independence (with Yates Continuity Correction) indicated a significant difference in this respect, $\chi^2(1, n=239) = 60.59, p = 0.001, \phi = -.51$.

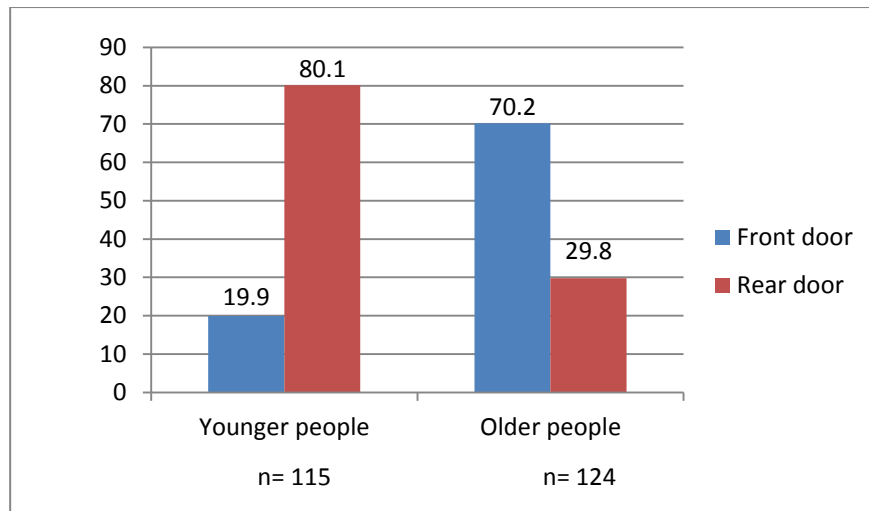


Figure 6.16 Percentage of young and older people using the front or back doors to get off the bus

Even though most of older people and some young passengers chose the front door for alighting, it is assumed that this is contrary to the regulations of the bus service. There were signs in each bus informing passengers that they should alight using the rear door. It was also observed that on several occasions drivers prevented passengers from alighting using the front door. In those cases, all passengers had to move through the bus and alight using the rear door. These findings allow corroboration of the commentaries of the majority of older participants in the focus groups study, who expressed the view that they preferred to use the front door for getting off because they did not feel safe using the back door, since they believed that drivers were not able to observe when passengers are alighting.

6.5.6.3 Time from standing up from the seat until getting off the bus

Besides the fact that older people stood up out of their seats with more anticipation and moved cautiously through the bus, it was also observed that they descended the stairs more slowly than younger passengers. Again it was noted that older users had more difficulties in completing that stage. Many of them were placing two feet on each step, holding tightly the handrails, and descending. A common pattern of behaviour was for older passengers to pause before descending the last step, especially when driver had stopped far from the kerb and the passengers had to 'jump' to get off. Indeed several times it was observed that older passengers had to turn backwards to be able to descend the last step.

Not surprisingly older people took more time to get off the bus than young users. Figure 6.17 shows the distribution of alighting time as defined in Section 6.4.3.1 . Results reveal that the average time for alighting from the bus was longer for older people (27.1 seconds) in comparison to the average of time for younger participants (20.7 seconds). An independent-samples t-test showed there was significant difference in the time for young people ($M = 20.7$, $SD = 7.4$) and older people ($M = 27.1$, $SD = 11.5$) to alight from the bus; $t(177.8) = -4.79$, $p = .001$, two tailed). The magnitude of the differences in the means (mean difference = -6.36, 95% CI: -8.99 to -3.74) was moderate (eta squared = .09).

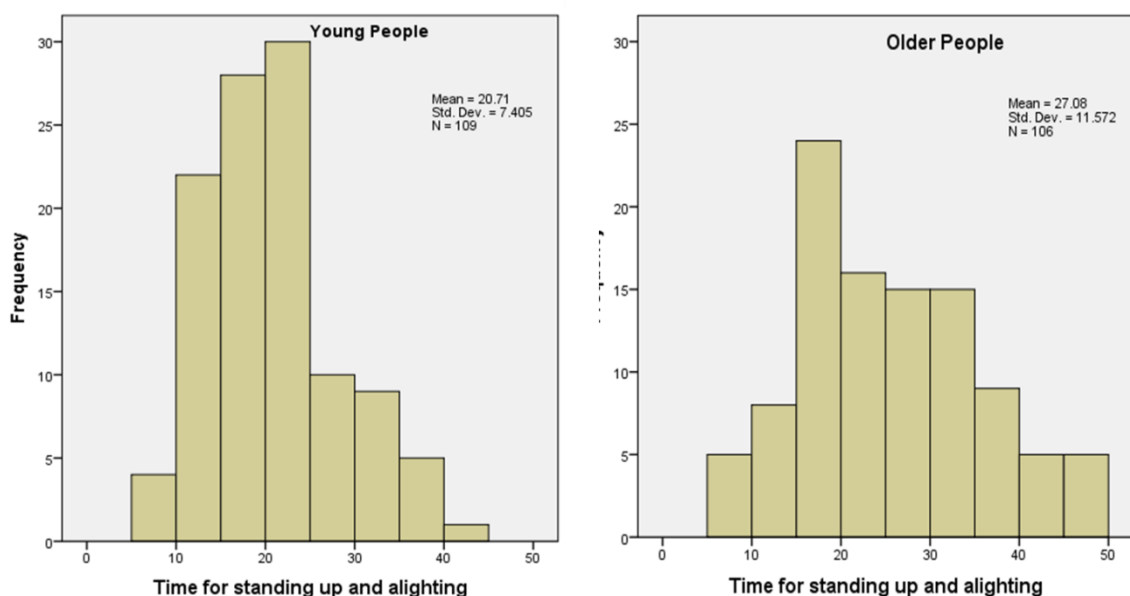


Figure 6.17 Distribution of alighting times for older and younger passengers

This difference between younger and older people can be explained by the same reasons as the difference in the time for boarding the bus. Current literature suggests that there are several reasons why older people take longer ascending and descending stairs than young people (Buckley et al., 2005; Hamel & Cavanagh, 2004; Tiedemann et al., 2007).

However, it is interesting to note that both young and older passengers took longer for getting off than the time that they used for getting on the bus. These findings seem inconsistent with those by Reid et al. (2011) who found that stair ascending is slower than descending. Notwithstanding, this somewhat contradictory result may be due to the

time for getting on and off in this study being measured not only for time climbing up and down stairs, but rather to and from seats.

Specifically in relation to older passengers, the fact that they took longer for getting off could be attributed to them being even more cautious during descending since it is a more demanding task in comparison to ascending (Reid et al., 2011; Startzell & Owens, 2000). Additionally, it is important to consider that accidents seem to occur more frequently during stair descent than during ascent (Startzell & Owens, 2000). For instance, based on the analysis of passenger casualties in non-collision incidents on buses and coaches in Great Britain between 1994 to 1998, Kirk et al. (2003) report that the incidence of injuries in decreasing order was highest for alighting, boarding, standing, and seated passengers.

Again this situation might have a safety implication for older passengers because the longer they take to get off, the greater the time that they are exposed to risk of losing their balance. This is consistent with the reports of participants, particularly older ones, in the focus groups study (Chapter 5) who expressed their perception of being at higher risk when they were getting off the bus.

6.5.7 Traveling accompanied

Prior to the study, it was expected that older passengers were more likely to travel accompanied, and to require assistance during travel. Participants, particularly older infrequent bus users, in the focus groups study (Chapter 5) expressed some concerns regarding using the bus service unaccompanied. They commented that their relatives repeatedly advised them ‘do not use the bus service on their own’ because it might be difficult and comprises some safety issues. Contrary to expectations, results from this study (see Figure 6.18) show that the percentages were similar for older (15%) and young people (14%) travelling unaccompanied, and this study did not find a significant difference between groups of passengers.

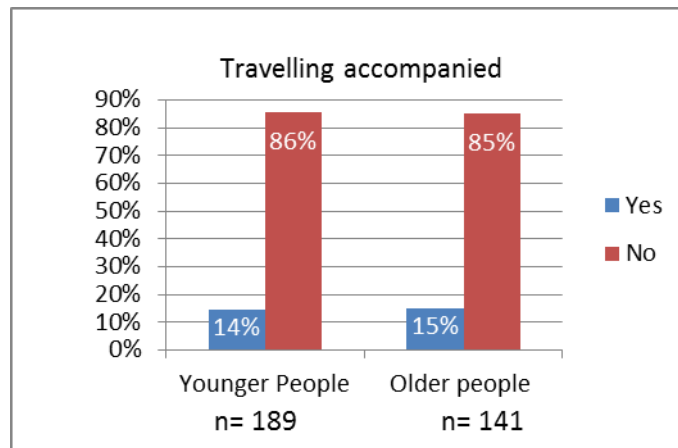


Figure 6.18 Percentage of young and older people traveling accompanied

A further analysis was made to investigate differences of younger and older passengers, who needed any help using the service, as defined in Section 6.4.3.4 , Figure 6.19 shows the percentage of passengers who needed to be helped for doing any of the tasks. A Fisher's Test indicated a significant difference in this behaviour among these groups of passengers, $p=0.06$.

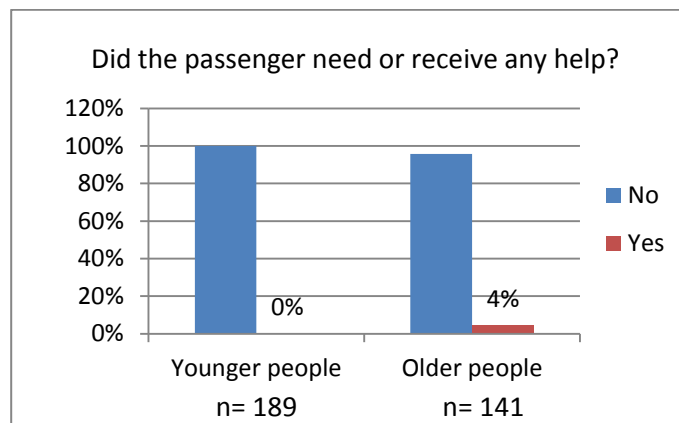


Figure 6.19 Percentage of young and older passenger who needed any help

Despite the differences above, it can be observed that only 4% of older passengers (six of them) needed any kind of help. Two of these older passengers were '*travelling independently*' (TI), however, the effect of acceleration and deceleration resulted in them needing to be supported by a third person to maintain their balance. Among them, an older woman, who was traveling with some bags and lost her balance several times; once she nearly fell but another passenger helped her and she was able to retain her balance. The other four passengers were *traveling accompanied dependent* (TAD). These passengers received support either when getting off the bus or for posture control

when moving to a seat or to the exit door. These times the help came from the person who was traveling with those passengers (mostly their partners).

These results suggest that all the younger people and practically all of the older passengers were able to use the service independently, as defined in Section 6.4.3.4 . This situation might be assumed as contradictory to what older participants on the focus groups stated regarding using the service unaccompanied. It might even be assumed to be a positive characteristic of the service because it appears to show that the bus service allows older people to travel unaccompanied and without assistance, in line with the desire that people do not depend on others to carry out their daily activities (Millán-Calenti et al., 2010). Nevertheless, these results need to be interpreted with caution since it is very likely to be the case that many older people with some mobility problems decide to not use the bus service due to the perceived and actual risks and difficulties associated with using it.

This proposition might be supported by the fact that only 7 (5%) of the older passengers were using a mobility aid. In comparison no young person with a mobility aid was observed using the bus service (see Figure 6.20). Five of the older people were using a stick, while the other two brought crutches with them. A Fisher's Test indicated a significant difference in this behaviour between younger and older passengers, $p = 0.002$.

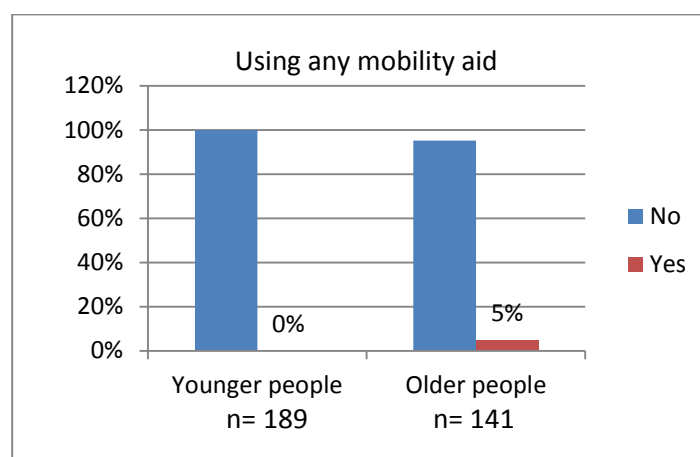


Figure 6.20 Percentage of young and older people using a mobility aid

Prior to the study, it was expected that there would be more passengers with mobility problems and/or using any mobility aid. The figures from the National Institute of Statistics and Geography (INEGI, according its designation in Spanish) in Mexico show

that 18% of older people suffer from mobility problems (INEGI, 2013). Such figures are consistent with those reported in the literature stating that mobility limitations are a common problem affecting up to 16% to 20% of the older population (Agree, Freedman, & Sengupta, 2004). In line with this, it is well-accepted that the use of mobility aids (such as walking sticks, walking frames, or crutches) can potentially compensate for disability and lessen handicap and thus decrease dependence (Edwards & Jones, 1998).

No published data were found on the percentage of people with mobility problems using an assistive device in Mexico. However, previous research suggest that most older persons with mobility problems accommodate their limitations with assistive devices, most commonly using canes (35%), walkers (27%), and wheelchairs (13%) (Agree et al., 2004). Therefore the small percentage of older passengers observed using a mobility aid in this study reinforces the idea that individuals who have mobility impairments prefer to not use the bus service. This view was stated by some participants with mobility impairments on the focus groups study (Chapter 5).

According to their views, using any assistive device makes it even more difficult using the bus service. In this study, it was observed that it was particularly difficult for those people using a mobility aid to use the service as they had to hold the sticks or crutches with one hand, and therefore could not use both hands to use the handrails. It was evident that mobility aids were not very useful whilst they were using the bus service.

6.6 Critique of the study

Overall the observational approach was an effective method of gathering information on the bus service and passenger behaviours. Observations provided a ‘snapshot’ of the reality of the bus service, and what younger and older passengers *do* rather than what they *say* they do. The implementation of the unobtrusive observation in this study allows observing natural behaviour from all of the actors involved in the service, and a direct comparison of older and younger passenger behaviour. The observational approach applied in this study helps to overcome some of the limitations of previous studies which have relied mostly on methods such as focus groups, interviews or surveys (see Broome et al., 2009). However, there are limitations in the study that must be acknowledged and that deserve consideration for future research using similar approaches in this research area.

The main potential limitation of the study relates to the inherent sampling bias within the study. First, given that observations were undertaken with current passengers, it is likely that the subjects in this study represent a healthy subset of the population of passengers. This is reinforced by the results in Section 6.5.7 that show that practically all the passengers were travelling independently, they did not need assistance, and only very few of them were using any mobility aid. It is likely that a considerable proportion of the older population with mobility issues, as well as younger disabled passengers and those with mental impairment, were unwilling or unable to use the bus service, and therefore did not appear in this study sample.

Secondly, another source of sampling bias was the issue of not being able to record data in very crowded buses due to lack of visibility of passengers. This situation restricted the observation of passengers in crowded buses, which might have several implications on the results of the study. For example, times for boarding and alighting are shorter than experienced during crowded periods. The percentage of passengers travelling standing is higher in those periods. In summary, the adverse travelling conditions are exacerbated when buses are overcrowded.

Finally, although the observational approach allows collection of data for a considerable number of passengers, it was possible to use this method only for the journey stages on the bus (boarding, travelling and alighting). This method did not allow for observing those passengers during the entire door-to-door journey. In addition, the observational approach limits understanding the subjective component of passengers' behaviour, e.g. thoughts and feeling related to safety or comfort as they use the bus service.

6.7 Summary and conclusions

This study represents a specific comparison of the behaviour of younger and older passengers on buses to investigate the additional gap in capability that occurs with older users based on the demand that the bus service imposes. The use of an observational method enabled an understanding of the behaviours of passengers, as influenced by the design and operation of the wider aspects of the bus service.

The purpose of the current study was to determine the effect of the bus service characteristics on the behaviour differences among younger and older passengers. The results suggest that passenger behaviour, and differences between younger and older passengers, are affected by features of the bus service such as bus design, bus driver

behaviour, crowded buses, and unstable journeys. These all raise safety issues and make it more difficult for passengers, and particularly older passengers, to use the bus service. More specifically, the study leads to the following conclusions:

- Crowded buses are frequent in the city and are likely to result either in difficulties in using the service or in injuries in the event of loss of balance for standing passengers.
- Unstable journeys are common due to sudden acceleration or deceleration by the driver, exacerbated by inappropriate bus design (manual transmission and rigid suspension), and poor road surface conditions (uneven roads and potholes). An implication of this is the possibility of increasing difficulties to move through the bus, and risk of falling.
- Bus drivers exhibited typical behaviour that negatively affects passenger's safety and the use of the service. Such behaviour is characterised by driving under time pressure, stopping far from the kerb, allowing little time for passengers boarding and alighting, driving away before passengers were seated, and little patience when interacting with passengers. In general, therefore, it seems that driver's behaviour has a strong effect on the passenger experience.
- Among the bus design characteristics with an impact on the user experience are rigid suspensions, manual transmission, entrances and exits with stairs, inappropriately placed handrails, and reduced seat pitch among others. These characteristics impose difficulties on using the service and raise safety issues for the passengers, particularly for older users.
- The combination of these conditions implies the existence of barriers to safe and comfortable use for older people and is likely to discourage the use of the bus service by the wider older or less able population - whether or not people feel safe using public transport has a significant effect on their willingness to use these services (WHO, 2007).
- Based on the percentage of older passengers with mobility aids (less than 5%) using the bus service, it is possible to infer that the observed sample might be an unrepresentative proportion of older people with any mobility impairment. Figures indicate that 18% of older people suffer from mobility problems in Mexico (INEGI, 2013), and it is expected that the majority of these people accommodate their limitations using any mobility aids (Agree et al., 2004).

Therefore it might be inferred that a proportion of the wider population do not use the bus service.

- This research has shown that, unlike young passengers, older users were boarding, moving through, and alighting from the bus significantly more slowly. They tended to be more cautious, especially when ascending and descending, and showed a greater degree of handrail use. Nevertheless, results suggest that they were significantly more likely to lose their balance.
- Older passengers employed specific strategies for reducing the gap between the demands of the bus service and their capabilities. For example, many of them climbed the steps placing both feet on each step, and also pulled themselves up using the handrails in order to overcome the step height. Another example was that older passengers anticipated their alighting by standing up out of their seat and moving toward the door in advance of the stop they were alighting.
- Additionally, findings showed that 62% of older passengers preferred to sit in the front area of the bus, and 70% did alight from the bus by the front door, even though the bus regulations state that passengers should board at the front, and alight from the rear. Young passengers did tend to board at the front and alight from the rear.
- The results from this study corroborate most of the findings expressed by young and older participants in the focus groups study, but there were issues raised by participants in the focus groups that the observations allow different interpretation. There were clear differences between how the passengers attributed poor service quality, and the root causes of this poor service. For example, participants highlighted the drivers as the number one problematic issue and blamed them for the instability of the journey. In this study, it was observed in at least 50% of the trips that the driving style employed included frequent acceleration and deceleration and sharp braking, but this was exacerbated by the frequent gear changes required with the manual gear boxes and the suspension design of the converted truck chasses, as well as the road conditions which were often very poor.

In addition to the above findings, although the study permitted the observation of a substantial number of younger and older passengers, it was not always clear why some things occurred, e.g. why some passengers were moving from one seat to

another, or why some passengers were travelling standing even when there were some free seats. Similarly, the study did not allow understanding the subjective component of passenger behaviour and experience.

Additionally, the study was able to observe behaviour on buses, but not to investigate other barriers related to the door to door experience. Participants in the focus group study raised concerns related to the rest of the journey, (e.g. difficulties crossing roads, long waiting times, among others) which were not corroborated in this study. In order to evaluate and contribute to the design of an inclusive service it is necessary to analyse the presence of barriers on each point of interaction (touch-point) with the service.

Chapter 7 Understanding barriers in using the bus service by older people

7.1 Introduction

Based on the analysis of self-report of participants, the study in chapter 5 identified what problems there are, where they occur and why, but this data was filtered by the participants' memory and/or might have been affected by educational, cultural or social differences (Johnson et al., 2010); The observation study reported in Chapter 6 was able to collect real-time data across a range of aspects but there was no elaboration by the participant on what was being observed i.e. there was no data about why they were doing what they did. In addition, participants in the focus group study raised concerns relating to the whole door-to-door journeys, which were not corroborated in the observational study due to passengers being observed only during boarding, travelling and alighting stages. In order to evaluate and contribute to the design of an inclusive service it is necessary to analyse the presence of barriers on each point of interaction with the service.

Studies in Chapter 5 and 6 found out that older people face more and greater problems when using the bus service compared with younger people. Consequently, the study reported in this chapter focusses only on older users, and was designed to gain a deeper understanding of the barriers in using the bus service and how older users felt when actually undertaking a door-to-door journey. The study was guided by principles from Service design, and the method and analysis of the results incorporates elements of Inclusive Design and Human Factors approaches, as well as a previous classification of barriers to use the bus service. The study also sought to fill the gap in research of this nature, in which the main methods frequently employed are focus groups, interviews and surveys (Broome et al., 2009).

7.2 Aims and objectives

The overall aim of this study was to examine the user's actions and the presence of barriers at each point of interaction that people aged 60 years and over might face when using the bus service with the intention of defining more precisely the nature of difficulties encountered. The specific objectives were:

- To identify the user's actions and the interaction points (touch-points as defined in Section 2.3.2) in each stage of a door-to-door journey using the bus service.
- To observe the way that older people interact with each touch-point of the service.
- To ascertain the main barriers that older people face in each touch-point of a door-to-door journey.
- To understand and categorise the barriers in each point of interaction according to its origin: psychosocial, physical, or from the service operation.
- To corroborate or counter some of the findings of the (previous) focus groups and observation studies related to the observed gap between older passengers' capabilities and the demand that using the bus exerts.

7.3 Study Rationale

The main purpose of this study was to investigate the barriers that older people face in relation to each touch-point of a door-to-door journey since the findings from previous chapters suggest that they are the most challenged group of users. To this end therefore older people were the only focus of the study. The results in the focus groups study (Chapter 5) had suggested that older people face more problems than younger users in using the service and that the level of inconvenience associated with those problems was greater. However, that study was based only on the perception of participants and was therefore open to errors resulting from incomplete and/or biased recall of past experiences. The observational study helped to corroborate, via triangulation, results from the focus group study, but also revealed that older passengers are at a disadvantage when they use the service in the boarding, traveling, and alighting stages because of the presence of an additional gap between their capabilities and the demand that using the bus exerts. The study in this chapter was specifically designed to provide a deeper understanding of older users' experiences and of the barriers across the whole journey that impose difficulties and might impede or prevent the use of the service. Therefore, the data collection method used was required to offer a comprehensive picture of the real time interactions that take place between older users and the interaction points involved in a door-to-door journey. This method enabled a comparison between what older people said before the trip, what they were observed doing, and how they felt when actually undertaking a door-to-door journey. The method

enabled participants to comment on problems in real-time, rather than rely on memory, which potentially offered more detailed data to be captured. Additionally, the method potentially enabled further data to be captured since the researcher was able to observe and follow-up on aspects which the participant may not have raised.

Since the studies in chapter 5 and 6 have produced a rich description of the problems and characteristics of the bus service, this study was mainly focussed on identifying user's actions and touch-points, as well as understanding the nature of the barriers in each stage.

7.4 Method

7.4.1 Overview

This study comprised a series of accompanied door-to-door journeys with older people. Data collection included a pre-trip interview, the observation of the actual bus service use, the use of probing questions whilst travelling, and a stimulated recall interview. The pre-trip interviews were designed to obtain, based on the previous experience, the overall perception that participants had in relation to the service, particularly about each stage of the journey. Based on previous studies (Nickpour et al., 2012; Tyler, 2002), and for the purpose of the data analysis, the journey was divided in seven stages, which later were sub-divided by user's actions. Figure 7.1 shows the stages of a journey that were included in this study.

Observation, probing questions and recall interviews were used to complement, compare and contrast actual events and behaviours with participants' perception about the bus service. Some of these techniques have been used previously in the use of transport by older people (Broome, Worrall, et al., 2010) and health research (Skovdahl, Kihlgren, & Kihlgren, 2004). Additionally, information regarding participants' demographics and their travel habits was collected using the same questionnaire as in the focus groups study (see Appendix A).

Data from the interviews were transcribed in full and thematically analysed using NVivo 9 (QSR International, 2010). These data were then complemented with what was observed by the researcher. The results were analysed and interpreted in terms of the type of actual and perceived barriers that participants face at each touch-point of a door-to-door journey.

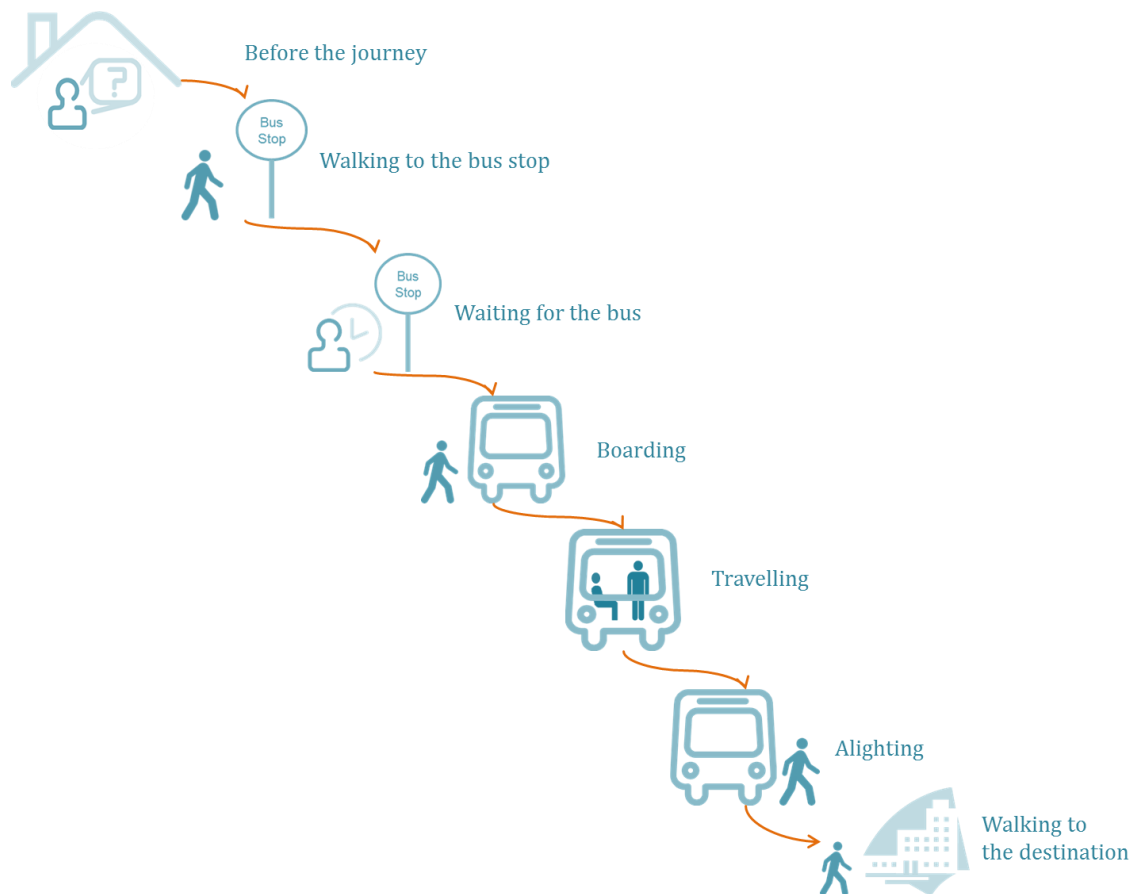


Figure 7.1 Stages of a journey

7.4.2 Participants

The study recruited a convenience sample of older participants, via a general call in the Metropolitan Centre of the Elderly (CEMAM, according to its designation in Spanish). Twelve older people were selected according to the eligibility criteria of being aged 60 years or over with appropriate language and cognitive abilities to respond to questions, undertake the interview and give informed consent, as well as have the physical ability to use the bus service. To encourage greater breadth in the data a combination of frequent and non-frequent travelers took part in the study.

7.4.3 Ethics

For any research involving human participants, an ethical checklist needs to be first completed. This acts as a screening mechanism to identify those studies which merit additional ethical support. Since this study included older people who were classed as a vulnerable population group, additional ethical controls were required. These were implemented by adding the study to the generic protocol number G04/P4 - Focus groups, Interview and Questionnaires with Vulnerable Groups. This protocol states that:

- Particular care should be taken to ensure that ‘vulnerable’ participants understand the form and scope of the research,
- The researchers will be instructed to ensure that at least one other person is present in the room,
- The risk of injury should be minimal, and
- Participants should only participate in activities that they are comfortable with.

An important issue for the ethics approval was that participants had to be physically able bus users, instead of disabled or non-users, since the study might be encouraging them into situations which they would not normally choose to be in.

Informed consent and participant information sheets were developed and used in the study (see Appendices D and G). These instruments were translated into Spanish language to be used with participants in Mexico.

7.4.4 Pilot

In order to assess the effectiveness of developed instruments and to refine the planned procedure a pilot test, comprising one participant, was carried out using the public transport system in the UK. As a result, some adjustments to the questionnaire were made e.g. a question related to the previous experience using the service was added. In addition, it also highlighted difficulties in undertaking audio recordings whilst travelling e.g. if the noise inside the bus was high and /or passenger did not speak loud enough it was difficult to listen to the track later; therefore the researcher was prepared for taking notes at these stages of the journey. It was clear that probing questions and the recall interview would be useful in obtaining more detailed information for use in corroborating the research across the studies.

7.4.5 Procedure

7.4.5.1 Recruitment

An invitation to participate in an accompanied journey was given in the form of a general call to people who were attending the CEMAM. People who were interested in taking part in the study were then informed about its objectives and procedure.

Participants were told what was expected from them and what they needed to do. Once they met the eligibility requirements and accepted the invitation, an appointment was arranged regarding the date, time and place to meet with them. The journeys could

either be started from their home address to a chosen destination or start from the day centre travelling to their homes. Three journeys were from their homes to the day centre and nine were from the day centre to their home.

7.4.5.2 Running the accompanied journeys

Although all the participants had been previously informed about the study objectives and procedure, they were given sufficient time at the start of the study to read the participant information sheet and ask questions. The informed consent form was then read and signed by the participants and following this the participants were asked to complete the demographics questionnaire.

The next step included the pre-journey interview. General questions were used to ask participants about all stages in a journey: “Please tell me about your experience in this stage” “what are your biggest problems in that stage?” and “what goes well?” Follow-up questions were applied in order to further probe any barriers, e.g. “have you had some problems when you try to use the handrails?” A set of prompt cards were used by the interviewer as a support tool during the interviews. Each card comprised a stage and the user’s actions (see Appendix H). Interviews were recorded using a Sony audio recorder.

After this interview, the participant and researcher started their journey and covered all the stages until the destination was reached. During the journey, the researcher observed –taking short notes and photos when possible - what participants were doing and saying. Participants usually spoke about the topics that they had previously mentioned in the interview, although different subjects appeared from time to time. The researcher used probing questions based on what participants were doing in each stage to maximise data collection.

Once their destination was reached, a recall interview was undertaken in order to allow the participants to add any further information and to enable the researcher to follow up on the participant’s comments and/ or actions. Following this, the researcher then thanked the participants and said goodbye.

Finally, the researcher formally documented their notes about the observed behaviours and the bus service using a bespoke data collection tool. The sheet comprised spaces for each stage of the journey and an extra space for general comments (see Appendix I).

These notes were also used to identify user's actions and the interaction points in each journey stage.

7.5 Data Analysis

The results from this study comprised different types of data sets which required different methods of analysis. Initially, a descriptive analysis, using Microsoft Excel, was applied to the demographics data gathered by the questionnaire.

The second part of the data analysis involved dealing with the audio recordings from the pre-trip and recall interviews. Files were fully transcribed and imported into the QSR International NVivo software. Based on the classification of barriers from previous research (Nickpour et al., 2012; Tyler, 2002) a theoretical analysis was undertaken. The analysis was also at a semantic and realistic level (Braun and Clarke, 2006; Robson, 2011) and was carried out following the procedure described by Robson (2011). Finally, the analysis was complemented with the notes resulting from the researcher's observations during the journey itself. This part of the analysis would be used to contrast and complement the data reported by the participants.

7.6 Results

This study aimed to examine the presence of barriers to the use of the bus service which might occur at each of the interaction points an older user engages with when using the bus service. This section presents the results and is divided into eight subsections. The first one describes the participants' characteristics and their travel habits. The following seven subsections contain the results in a sequential way that corresponds to the order in which users use the bus service reflecting the journey stages shown in Figure 7.1. The results are presented through a series of figures that were built and based on concepts related to Human Factors (task analysis), Service Design (touch-points and sequential actions), and previous classifications of the barriers in using the bus service (Nickpour et al., 2012). Additionally, the results are complemented with a description of the observations noted by the researcher.

7.6.1 Participants characteristics and travel habits

A total of 12 older people participated in the accompanied travel study; 58.3% (7) female and 41.7% (5) male. The range of ages was between 60 and 83, (mean = 69.8, SD = 7.4 years). Nine were frequent passengers and three non-frequent passengers.

Seven participants stated that they had physical problems which limited their mobility. The problems included knee and back pain and/or visual limitations. Table 7.1 summarises the participant demographics.

Table 7.1 Participants' characteristics (n=12)

Variable		
Age	Mean (min-max)	69.8 (60/83)
Gender	Male	42%
	Female	58%
Living situation	Alone	17%
	With partner	17%
	With children	33%
	With partner and children	33%
Physical problems limiting mobility	Yes	58%
	No	42%
Employment status	Employee	8%
	Retired	42%
	Self-employed	33%
	Other	17%
Main source of income	Employment	8%
	Pension	42%
	Own business	17%
	Financial support from relatives	33%
Monthly income (Mexican pesos)	Less than \$3,500.00	50%
	\$3,501.00 and \$7000.00	17%
	\$7001.00 and \$ 10,500.00	0%
	More than \$10,500.00	33%

A general overview of participants' travel habits using the public transport system is shown in Table 7.2. For most participants, the bus service was the most usual mode of transport, and where passengers stated they used the bus service during the morning peak periods, this included periods where they were *required* to (e.g. for medical appointments) rather than *choosing* to do so.

Table 7.2 Travel habits of participants

Reason to use the bus service	%	Average Frequency	Time of the day
Visit friends or family	50	Monthly	Morning
Medical services	58	Monthly	Morning
Shopping	50	Weekly	Afternoon
Attending clubs or associations	100	Twice per week	Morning
Banking	0	-	-
Work	0	-	-

7.6.2 Before the journey: User's actions, touch-points and barriers

Figure 7.2 shows the user actions, touch-points and barriers that participants reported as part of the stage prior to travelling. User's actions and touch-points were identified by the researcher based on what was observed at that stage of the journey, while the barriers were reported by the participants themselves, with the number reporting each barrier given in brackets. The figure comprises the barriers that were reported by most participants as those imposing greater difficulty in using the service.


Stage of journey		Before the journey 
User actions		<ul style="list-style-type: none"> Decide on using the bus service Finding and consulting information Buying <i>transvales</i> (special tickets for older people)
Touchpoints		<ul style="list-style-type: none"> Previous experiences Web site Printed maps Other users Offices to buy <i>transvales</i>
Barriers identified by participants	Physical	
	Service operation	<ul style="list-style-type: none"> Few places to buy <i>transvales</i> (11) Lack of information or designed inappropriately (5)
	Psychosocial	<ul style="list-style-type: none"> Concerns over being physically hurt at some stage whilst using the bus service (12) Have been injured whilst using the bus service (9)

Figure 7.2 User actions, touch-points and barriers before the journey

Although, there were no evident physical barriers to observe at this stage, it seemed that previous experience was the most significant barrier or enabler for bus use. For instance, it was not necessary to consult information about the service since participants were already familiar with the bus routes relevant to their journey (enabler). However, previous negative experiences combined with the participants' physical limitations appeared to increase the number of concerns in using the service. For example, some participants who suffered knee pain expressed concerns regarding the long distances to walk to catch the bus. Other participants who reported previous negative experiences stated the importance of having to hurry themselves in order to avoid the time when

buses were overcrowded. They raised the concern that when buses were overcrowded the journey was more difficult, and it might be easier to be injured.

It was also noted that five participants did not have *transvales* to travel. When they were asked for the reason, three of them stated that they were not able to get *transvales* recently due to the long distances to walk to obtain them and lack of places to acquire them. Another participant expressed that he preferred not to use them to avoid being mistreated by drivers. One more said that he did not need to use *transvales* and he preferred to pay the full cost of the journey.

7.6.3 Walking to the bus stop: User actions, touch-points and barriers

This stage started at home or in the day centre and it included walking on pavements, crossing roads and/or avenues and was completed once the bus stop was reached.

Figure 7.3 shows the user actions, touch-points and barriers that participants reported as part of this stage. Most of the participants reported problems related to the lack of pavements or their poor conditions; the amount of traffic and the lack of consideration from other road users towards pedestrians. Participants stated that these conditions increase their fear of falling or being run over by traffic.


Stage of journey		Walking to the bus stop 
User actions		<ul style="list-style-type: none"> • Walking along pavements • Crossing roads and avenues • Finding the bus stop
Touchpoints		<ul style="list-style-type: none"> • Pavements • Roads and avenues • Other road users • Signal of the bus stop
Main barriers identified by participants	Physical	<ul style="list-style-type: none"> • Lack of pavements or in poor condition (11) • Long distances (9) • Lack of pedestrian crossings (8) • Large amount of traffic (8)
	Service operation	<ul style="list-style-type: none"> • Lack of information related to where the bus stops are (3)
	Psychosocial	<ul style="list-style-type: none"> • Fear of falling due to poor pavement conditions (11) • Fear of being run over by traffic (8) • Lack of consideration from other road users towards pedestrians (7) • Perception of being at risk due to crime (3)

Figure 7.3 User actions, touch-points and barriers while walking to the bus stop

According to what was observed by the researcher, walking distances to the bus stop varied from 200 to 1400 metres. The presence of some hills and the hot weather meant that some participants – especially those with some physical mobility problems – often had to pause during this stage. In addition to distance, difficulties using the pavements due to unevenness, holes, and a series of obstacles like cars, commercial stalls, and bicycles, among others, were also corroborated. The journeys with all the participants included at least some pavements in poor conditions. Figure 7.4 shows some examples of these pavement conditions.



Figure 7.4 Unevenness, and obstacles on pavements

Due to such pavements conditions, it was noted that all the participants often stepped off the pavements and into the road as shown in Figure 7.5. When they were asked for the reason for not using the pavements, the participants stated that the roads had fewer obstacles to walking. However, since there were some roads with a large amount of traffic the researcher asked and helped them to walk along the pavements.



Figure 7.5 Participants preferred to not use pavements due to unevenness and obstacles

It was also noted that on approximately 90% of the roads and 50% of the avenues there were no pedestrian crossings and no pedestrian traffic lights were found on any of the roads or avenues used for the journeys. It was frequently observed that drivers did not care about pedestrians waiting to cross the road, therefore, the participants and researcher had to find a safe moment to do so. At least twice the researcher had to stop a participant from stepping out in front of a moving car.

7.6.4 Waiting for the bus: User actions, touch-points and barriers

Figure 7.6 shows the user actions, touch-points and barriers that participants reported as part of this stage. Most of these barriers were corroborated during the accompanied journeys. For instance, regarding the bus stops, it was noted that in less than 50% of occurrences there was a sign to indicate the place for a bus stop. The most common place to wait for a bus was on a corner, and on a very few occasions there were sheltered bus stops. It was unusual to find a bus stop with good pavement conditions.


Stage of journey		Waiting for the bus 
User actions		<ul style="list-style-type: none"> • Access to the bus stop • Waiting for the bus • Identifying correct oncoming vehicle • Being detected by driver
Touchpoints		<ul style="list-style-type: none"> • Pavement • Bus stop (location, shelter and seats) • Bus route number • Visual contact with the driver
Main barriers identified by participants	Physical	<ul style="list-style-type: none"> • Lack of pavements or in poor condition (8) • No seats or sheltered bus stops (7) • Difficulties to identify the coming bus due to poor design of the bus route display (6)
	Service operation	<ul style="list-style-type: none"> • Infrequent and unreliable service (11) • Crowded buses (11) • Frequently drivers do not want to stop and collect older people (9) • Lack of information relating to timetables (5)
	Psychosocial	<ul style="list-style-type: none"> • Uncertainty over how long it is necessary to wait for the bus (10) • Perception of being at risk due to crime especially during nights (3)

Figure 7.6 User actions, touch-points and barriers at the bus stop

With respect to issues relating to waiting time, it was observed that there was a lack of timetables and so participants did not know how long they had to wait for the bus. It was noted that in 70% of the cases the bus arrived in less than ten minutes, but twice it took more than 20 minutes. It was also recorded that on two occasions a driver did not stop to collect the participant and other passengers who were at the bus stop.

A barrier not reported by participants, but which was observed in more than 50% of the times, was the presence of cars parked near to or in the bus stop, which prevented participants to see the coming buses or being detected by the driver. In all those cases, the participant and researcher had to be standing in the road to identify the coming bus.

7.6.5 Boarding: User actions, touch-points and barriers

This stage commenced with the passengers climbing the steps at the front of the bus and finished when the participant had moved to a seat or a place to travel standing, if no seat was available. Figure 7.7 shows the user actions, touch-points and barriers that participants reported as part of this stage. The number of barriers that participants

reported for this stage was higher than the previous ones. The observation of the participants and their comments at this stage allowed the researcher to corroborate the presence of most of those barriers. An initial barrier related to boarding the bus. It was noted that drivers never pulled the bus up to the kerb; therefore, participants had to climb the first step from road. Most of the participants were physically able to climb the steps, but with varying degrees of difficulty. They climbed the steps placing both feet on each step, and also pulled themselves up using the handrails in order to overcome the step height (particularly the first one which was typically about 40cm high) or to maintain their posture and balance. There was one participant with physical impairments for whom the task was really difficult and she requested assistance from the researcher.

It was noted that passengers had to climb the steps, make the payment, and move to a seat rapidly because the driver usually drove off once the passengers were on the bus. No driver waited for a participant to be seated. At the moment of paying and moving to a seat, it was observed that the participants strongly grasped the available handrails to maintain their posture. On four occasions, the researcher had to help a participant to maintain their balance. Nine participants did not use the horizontal handrails – located at 170 centimetres above the bus floor - preferring instead to hold onto the seatbacks. They explained to the researcher that the handrails were too high, and even though some of participants were able to reach the handrail, more effort was required to hold it when the bus was moving.

Crowded buses were registered for at least 40% of the accompanied journeys, to the extent that there were no seats available and some passengers had to travel standing. With respect to other passengers' behaviour, on three occasions it was noted that a younger person was using a priority seat and did not give it up for the older participant boarding the bus. Additionally at a bus stop with many younger users waiting for the bus – there was no queue and it was observed that when the bus arrived those users showed no consideration towards the older participant, and tried to board the bus first.


Stage of journey		Boarding 
User actions		<ul style="list-style-type: none"> • Climbing the stairs • Grasping the handrails • Paying to the driver • Receiving the ticket • Identifying and moving to a seat
Touchpoints		<ul style="list-style-type: none"> • Pavement (or road) • Bus entrance (doors) • Bus steps • Handrails • Other users • Driver • Bus floor
Main barriers identified by participants	Physical	<ul style="list-style-type: none"> • Steps too high (especially the first one) and poorly designed (11) • Difficulties for posture control due to the bus moving (10) • Lack of pavements or in poor condition (8) • No or inappropriately placed handrails (8) • Long distance between the bus step and the kerb (3)
	Service operation	<ul style="list-style-type: none"> • Crowded buses (11) • Unfriendly drivers (11) • Short time for boarding (9) • Drivers drive off before passengers are safely located in the bus (7)
	Psychosocial	<ul style="list-style-type: none"> • Fear of falling due to being under time pressure and poorly designed steps and handrails (11) • Perception of mistreatment from drivers due to older people using <i>transnavales</i> (11) • Sometimes younger people do not respect priority seats (10) • Negative behaviour of other passengers (7)

Figure 7.7 User actions, touch-points and barriers at the boarding stage

7.6.6 Travelling: User actions, touch-points and barriers

Figure 7.8 shows the user actions, touch-points, and barriers that participants reported as part of this travelling stage. Problems during this stage were related to crowded buses and the characteristics of the journey. Travelling was easier for those participants who were able to find and use a seat. Conversely, three of them faced more difficulties due to having to stand whilst travelling. The researcher travelled standing for 11 journeys and also experienced some difficulties in maintaining posture when a journey was jerky or bumpy. In these crowded conditions it was also difficult for the participants and researcher to board and move through the bus.


Stage of journey		Travelling 
User actions		<ul style="list-style-type: none"> • Getting into seats • Maintaining seating or standing position • Identifying arrival point
Touchpoints		<ul style="list-style-type: none"> • Seats • Handrails • Other bus users • Visual contact to the external environment
Main barriers identified by participants	Physical	<ul style="list-style-type: none"> • Difficulties for travelling standing due to the bus moving (11) • Lack of room moving around the bus, especially when crowded (9) • No or inappropriately placed handrails (8) • Uncomfortable seats and lack of space between them (7) • No space to travel with bags (6)
	Service operation	<ul style="list-style-type: none"> • Crowded buses (11) • Fast, jerky or bumpy ride (10) • Poor driving style (10)
	Psychosocial	<ul style="list-style-type: none"> • Fear of falling due to erratic movements of the bus (11) • Lack of seats or being used by younger people (10) • Negative behaviour of other passengers (7)

Figure 7.8 User actions, touch-points and barriers at the moment of travelling

At this stage participants were more interested in talking about the characteristics of the bus service than in previous stages. Some of them commented on the driver's poor driving or that the driver wanted to collect more passengers even though the bus was crowded. Other participants commented on other passengers' behaviour like younger people using priority seats or pushing other passengers.

7.6.7 Alighting: User actions, touch-points and barriers

This stage commenced with the passengers standing up from the seats and moving to the door and was completed when the participant got off the bus. Figure 7.9 shows the user actions, touch-points, and barriers that participants reported as part of this stage. As in the boarding stage, participants reported lots of problems in relation to alighting from the bus. However, according to participants, getting off the bus was even more difficult, not just because they need more support to climb down the steps, but also because drivers do not want passengers to alight through the front door. It was noted that ten out of the 12 participants used the front door to alight from the bus and although a driver

was not observed asking passengers not to do this, two participants who used the rear door to exit said that they did so in order to avoid a confrontation with the driver.


Stage of journey		Alighting 
User actions		<ul style="list-style-type: none"> • Standing up • Getting out of seats • Moving to the exit door • Ringing the bell (or asking the driver to stop) • Climbing down the stairs
Touchpoints		<ul style="list-style-type: none"> • Handrails • Other bus users • Bell • Driver • Bus steps • Pavement (or road floor)
Main barriers identified by participants	Physical	<ul style="list-style-type: none"> • Steps too high (especially the last one) and poorly designed (11) • Difficulties for posture control due to the bus moving (10) • No or inappropriately placed handrails (8) • Lack of pavements or in poor condition (8) • Only one bell and highly located (3)
	Service operation	<ul style="list-style-type: none"> • Crowded buses (11) • Short time for alighting (drivers want to drive off as soon as possible) (10) • Drivers calling to use the rear door (9)
	Psychosocial	<ul style="list-style-type: none"> • Fear of falling due to being under time pressure and poorly designed steps and handrails (12) • The critical need for the use of the front door to avoid being hurt (as opposed to convenience) (11) • The feeling of being under time pressure to alight the bus (11)

Figure 7.9 User actions, touch-points and barriers at the alighting stage

It was observed that the older users had considerable difficulty in actually exiting from the bus. Many of them placed two feet on each step, tightly held the handrails, and descending slowly. A common pattern of behaviour was for passengers to pause before descending the last step, especially when driver had stopped far from the kerb and the passengers could not step easily onto the pavement. In fact it was detected that six participants had to turn round and descend backwards in order to be able to negotiate the final step off the bus. A relevant observation at this stage was that despite the researcher's role being simply that of an observer, it was sometimes necessary to intervene and help some participants to alight from the bus in order to avoid a possible fall.

7.6.8 Walking to the destination: User actions, touch-points and barriers

Figure 7.10 shows the user actions, touch-points, and barriers that participants reported as part of this stage. Problems during this stage were similar to those reported and experienced by participants in the stage of walking to the bus stop. However, at this stage of the journey, the participants were keener to talk about their experience using the service. They were using expressions like ‘did you see that ...?’ or ‘I had forgotten to say that ...’


Stage of journey		Walking to the destination 
User actions		<ul style="list-style-type: none"> • Walking along pavements • Crossing roads and avenues • Arriving to the destination
Touchpoints		<ul style="list-style-type: none"> • Pavements • Roads and avenues • Other road users
Main barriers identified by participants	Physical	<ul style="list-style-type: none"> • Lack of pavements or in poor conditions (11) • Long distances (9) • Lack of pedestrian crossings (8) • Large amount of traffic (8)
	Service operation	
	Psychosocial	<ul style="list-style-type: none"> • Fear of falling due to bad pavement conditions (11) • Fear of being run over by the traffic (8) • Lack of consideration from other road users towards pedestrians (7) • Perception of being at risk due to crime (3)

Figure 7.10 User actions, touch-points, and barriers while walking towards destination

7.7 Discussion

This study aimed to identify the user’s actions and examine the presence of barriers at each point of interaction that older people might face when using the bus service. The analysis of the 12 accompanied journeys and the results of this analysis in terms of the user’s actions and the interaction points along the whole service are fundamental in examining the nature of the barriers that older people face when using the bus service. Additionally, the analysis integrates elements from the Service Design approach – user’s actions and touch-points -, Inclusive Design approach – through the consideration of older users -, and the Human Factors perspective – task analysis and the gap between tasks demand and the user’s ability -.

This discussion of results comprises four sections:

1. Touch-points and barriers in a door-to-door journey
2. The nature of barriers
3. The gap between user capabilities and task demands
4. The value of accompanied journeys

7.7.1 Touch-points and barriers in a door-to-door journey

The results from this study show that the use of the bus service implies the user to perform several actions and interact with many touch-points along to a door-to-door journey. It is interesting that the touch-points are not always physical artefacts, but rather people – drivers and other road or bus users – or even the user's previous experiences. However, according to the information gathered from the participants and the observation of the journey, it was also found that there was a barrier to interact with every single touch-point of the service.

These results corroborate the findings of a large amount of previous work in this field (Broome et al., 2009). Nevertheless, it should be highlighted that previous studies report a lower number of barriers than those reported in this study. A possible explanation for this difference may be that the main methods frequently employed in research of this nature are focus groups, interviews and surveys, with a few studies employing more than one method (Broome et al., 2009), whereas the methods used in this study facilitated the collection of more detailed data from participants actually using the service.

There is, however, another possible explanation due to the fact that much of the previous research has been undertaken in developed countries where the existence of regulatory and legislative regimes encourages the transport operators to provide an inclusive transport service. Conversely, in developing countries which often lack such requirements, such barriers are more widespread (WHO, 2007) and their impacts can be more severe. Results from this study, along with those reported in chapter 4 suggest that such is the case of the bus service in Guadalajara, Mexico.

7.7.2 The nature of barriers and the need for an inclusive service approach

Based on earlier literature on this subject (Nickpour et al., 2012), the barriers were analysed and categorised according to their origin: physical, from the service operation, and psychosocial. Aside from the stage ‘before the journey’, physical barriers were reported by participants and observed by the researcher in all the stages of journey. These barriers were mainly related to the built environment and the design features of the bus. Barriers from the service operation were also in most of the stages, with the most severe manifestations relating to drivers’ behaviour and crowded buses. Finally, psychological barriers, characterised by safety concerns, fear of falling and several uncertainties (e.g. when a bus is coming or whether or not a driver will stop to collect a passenger, among others) along the journey, were reported as part of the experience by all participants.

It is encouraging to compare the findings with those found by Nickpour et al. (2012) who report that even though there were some physical and operational issues, the most striking issue to emerge from their research was the role psychosocial factors played in shaping the participants’ experience. According to this finding, they emphasise the importance of considering not only the physical issues that impose difficulty in the use of the bus service, but also the psychological factors that affect the experience of using the bus service. As stated by these authors, although physical elements are extremely important the psychosocial issues are equally or perhaps even more significant.

Whilst in their study Nickpour et al. (2012) found few physical and operational issues, the findings in this study suggest the presence of many barriers of this nature along with numerous psychosocial barriers as well. It is not difficult to explain this difference since the study of Nickpour et al. (2012) was based on the London bus service, where there has been much effort to improve the physical elements of accessibility, and the service operation is under a stronger regulation. However, although the bus service in Guadalajara comprises a lot of physical and operational barriers, findings of this study indicate that psychological barriers are also significant and should receive especial attention when evaluating and designing the service. Such a statement comes from the fact that analysing psychological barriers enables a better understanding of the user experience and the impacts of physical and operational ones. For instance, at the stage ‘before the journey’ all the participants ‘stated concerns over being physically hurt whilst using the service’ which is psychological barrier. From this concern it is possible

to obtain a better understanding of what a physical barrier (e.g. steps too high) means in terms of the user experience, and how a barrier might dishearten an older person in using the service.

7.7.3 The gap between user capabilities and task demands

Based on the number of barriers at each stage along with the number and characteristics of participants who raised concerns about them, the results suggest that there is a relationship between the level of task demand and the users' capabilities. It is known that given declining functionality due to the ageing process e.g. in relation to motor, visual, auditory, cognitive, or health performance, the gap between personal capabilities and environmental demands become wider, hence older people encounter increasing difficulties in undertaking their daily activities (Rogers et al., 1998; Seidel et al., 2009).

The findings show that the three stages with higher number of barriers were boarding, travelling and alighting. These stages include tasks like step negotiation (climbing up and down stairs) and posture control whilst the bus is moving. Literature refers to these as high demand tasks (Maki & McIlroy, 1997; Redfern et al., 2001; Startzell & Owens, 2000). Moreover, as it was discussed in chapter 6, the degree of challenge of step negotiation might increase due to structural and environmental factors, e.g. the height of the steps, the existence of handrails, or the level of illumination. Such a situation was compounded by the fact that passengers were usually under pressure and the driver did not park close to the kerb meaning that passengers had to board from road level.

Although boarding, travelling and alighting were the stages with the higher number of barriers, the results of this study were used to investigate the gap between user capability and the demand of each task in all stages of the door-to-door journey. For instance, participants with reduced mobility found the lack of pedestrian traffic lights to be a barrier (physical) and reported fear of being run over by traffic (psychosocial barrier). This example illustrates the gap between the demand of crossing the road without a pedestrian traffic light and the reduced capability of the older participants as well as the meaning of this in the context of the user experience in using the service.

7.7.4 Gathering insights: The value of accompanied journeys

According to Polaine et al. (2013), gathering insights into the experiences, desires, motivations, and needs of the people who use and provide services is a fundamental element of Service Design. These authors describe three levels of insights: Low – which

can be obtained from what participants say, it does not include any other activities such as observation, site visits or testing -; medium – this analysis provides deeper insights based on what the participants say, plus what the researchers observe from a larger amount of users -; and, high – this level of insight elicits what something (e.g. as a barrier) really means in terms of the user experience. Consequently, the value of the accompanied journeys is that they allowed high level insights from the participants about the real meaning and implications of using the bus service to be obtained.

This method provided a deeper understanding of the thoughts, actions, and emotions that older people experienced in real time when using the service. It allowed the comprehension of the participants' relationship with the service across the different journey stages and their transition through the various touch-points. The results of this study show a range of issues identified by participants that would not be readily apparent to transport service designers, or even other passengers, some of which have a personal and temporal element. Many are issues or experiences that arise from specific touch-points within the transport service, e.g. participants often stepped off the pavements and into the road because the roads had fewer obstacles to walking and also because some of them had previously experienced some falls due to poor paving. Furthermore, the use of this method enabled an understanding of the underlying reasons as to 'why' users behave in apparently illogical ways. Such is the case of using the front door for alighting the bus or walking along the roads instead of pavements, for which participants expressed convincing reasons based on their physical limitations (e.g. knee pain), previous experiences (e.g. been injured previously doing the same action or in relation to the same touch-point), or actual circumstances at that moment (e.g. a driver who seemed to have no consideration towards older users).

Accompanied journeys were useful in identifying user's actions and touch-points, as well as obtaining a 'snapshot' of the gap between task demands and user capabilities. Additionally, the use of this method generated closeness to the participants who seemed to be excited and happy to share their experiences with somebody who was 'trying to be in their shoes'.

A possible drawback was related to the role assumed for the researcher. The use of this methodology suggests the researcher role is only to observe and interact verbally with participants (McDonald, 2005). However due to the presence of safety issues inherent

in the context of this study, the researcher sometimes had to intervene to avoid the participant to be injured. For instance, there were occasions when the researcher helped a participant to keep his/her posture or needed to assist when a participant was alighting from the bus and almost fell. This situation demonstrates the level of problem that using the current service implies for older people. Nevertheless, although the researcher's intervention extended beyond of the defined scope of this method, not to intervene would have been unethical, since it might have had negative consequences for the participant.

7.8 Conclusions

The study in this chapter examined the user's actions, the interaction points and different types of barriers that older people face in using the bus service for a door-to-door journey. In terms of knowledge the study provided two outputs, firstly, it identified a list of tasks that the users perform when using the bus service and a series of touch-points relating to user action and stage of the journey. Secondly, based on what participants said and what they were observed doing the study identified the main barriers that the participants faced during a door-to-door journey. Later, the analysis of the barriers allowed their categorisation into physical, psychological, and service operation causes.

The identification of actions and touch-points provided an opportunity for the analysis and evaluation of those service components that need to be redesigned to improve the service. Meanwhile, the recorded and observed barriers corroborate results from studies in chapters 5 and 6, but also offered an interesting point of comparison with previous studies undertaken in countries with different infrastructure and service traditions.

In methodological terms this study used a different approach to those frequently employed in research of this nature i.e. focus groups, surveys and interviews, and therefore provided the research with a range of valuable insights. Although a large volume of data had been obtained from the previous studies within this thesis – focus groups and observations-, this study enabled collection of real-time data across a range of aspects with the additional participants' feedback. Therefore, as discussed in Chapter 3, this study enabled not only corroboration and clarification of results of previous studies, but also extended the results to a deeper level of understanding of the 'real' meaning of using the bus for older people.

This level of understanding combined with the objective data collected in the previous studies (Chapters 5 and 6) provide a richness of evidence, which can be presented to stakeholders to promote service improvement. In addition, this study provided unique information that bus service stakeholders may not be aware since they are usually younger than their older users, and are unlikely to directly experience for themselves the physical and psychological challenges that such passengers face in using the bus.

Chapter 8 Development of an *inclusive* service blueprint

8.1 Introduction

The preceding studies have captured a ‘snapshot’ of the context in which the bus service is operating (Chapters 4 and 6), and the barriers that impose difficulties in using the service and their impact on the younger and older users’ experience (Chapters 5, 6, and 7). However, in order to translate raw data into useful insights and to communicate these insights to the bus service stakeholders, an *inclusive* service blueprint was developed. As stated in the literature review, service blueprinting is a visualisation technique used for these purposes and it is a fundamental practice in Service Design (Segelström & Holmlid, 2009; Segelström, 2009). The literature review also highlighted the lack of tools that support effective use of user data in the design process (Dong et al., 2013; Nickpour & Dong, 2011).

This chapter describes the development of the *inclusive* service blueprint, that helps to visualise and communicate insights on the actual features of bus service and the gaps between what service providers do and what younger and older users expect or need according to their abilities. The chapter begins with a synthesis of the evidence from the earlier studies that was used by the blueprint development, followed by the description of the procedure used to create the first version of an inclusive service blueprint. Then to conclude, the final version is presented.

8.2 Evidence from studies used for the blueprint development

The first study (Chapter 4) identified a number of important issues related to the features of bus service provision. These data were mainly used to complete the backstage section of the inclusive service blueprint. The issues included were:

- The urban investment has not favoured public transport as a mobility option,
- There is a lack of a regulatory and legislative regime to incentivise the provision of a good quality transport system,
- Buses are designed around a truck chassis due to the lower cost,

- The bus service is an informal organisation comprising people who own their own bus and who work in competition with others,
- The lack of support from service operators towards drivers,
- The fact that drivers are paid directly out of the fares they collect, and therefore pressurised to pick up as many passengers, as quickly as possible,
- Drivers work shifts of up to 13 hours without fixed breaks, and do not receive proper training for doing their job
- There is a poor public perception of the quality of the service.

Data from studies in Chapters 5, 6 and 7 were used to complete the onstage section of the inclusive blueprint. Chapter 5 (focus groups with passengers) identified the problematic issues that impose greatest difficulty in using the service and their impact on younger and older peoples' experience. Evidence from this study included:

- Prioritisation by younger and older participants of the problematic issues that impose greatest difficulties (Table 5.4),
- Data relating how each problematic issue affects younger and older users' experience in terms of actual and perceived safety, usability problems, comfort and security (Figure 5.4).

Based on the observation of the differences in the behaviours of younger and older passengers when boarding, travelling on, and alighting buses, the third study (Chapter 6) provided evidence of the gap between the personal abilities of these groups of passengers considering the demand that using the bus exerts (Sections 6.5.4 to 6.5.6). Additionally, this study provided evidence to supplement the backstage section of the blueprint (Section 6.5.3).

The final study, reported in Chapter 7, identified barriers for older people along the service process. Specifically the study identified (Section 7.6):

- The tasks that the users perform when using the bus service,
- The touch-points relating to each user action and stage of the journey,
- The main barriers that the older participants faced during a door-to-door journey,
- The categorisation of the barriers into physical, psychological, and service operation causes in line with Nickpour et al. (2012).

8.3 Purpose of the *Inclusive Service Blueprint*

An objective in this research project was to integrate inclusive design and service design principles for designing inclusive services. The development of an *inclusive* service blueprint aimed to accomplish the following specific objectives:

- To provide a sense of inclusiveness to service blueprinting,
- To visualise and communicate the difference in the level of difficulty using the service for younger and older people,
- To help in demonstrating visually how the gap between personal abilities and environmental demands become wider for older people.
- To provide a means for contrasting the ideal service and the younger and older user experience within the existing service.
- To detect and visualise the points of interaction associated with higher level of difficulty, particularly for older users; and therefore to provide a set of priorities for designing a more inclusive bus service,
- To visually represent that by addressing older people's needs in improving the service, the needs of younger people might be considered as well.

Additionally, the use of the blueprint as a tool aims to accomplish the following objectives, which are similar to those in a typical blueprint:

- To create a detailed visual representation of the total service over time, and to make explicit the user actions and touch-points, and
- To provide a common platform and point of discussion for all stakeholders to participate in the service development or service improvement.

8.4 *Inclusive service blueprint creation process*

In line with Bitner et al. (2008) and Polaine et al. (2013) the creation of a blueprint usually follows these basic steps:

1. The first step in creating the blueprint is to establish the stages of the service over time,
2. Second, the actions of users on each stage should be defined,
3. In line with user actions, the contact employee actions, both onstage and backstage, can be described, followed by support processes.
4. Finally, the physical evidence should be added to the blueprint.

The steps described by Clarkson & Coleman (2013) in developing inclusive design tools were followed to the extent possible to represent the younger and older users' experience (see Section 2.4.5). In addition, some considerations and adaptations were made in terms of format and content. The next two sections describe these considerations and the procedure for creating the blueprint.

8.4.1 The format of the blueprint

The inclusive service blueprint was designed considering the typical format of a blueprint, including the onstage and backstage divided by the visibility line. It can be seen from the Figure 8.1 that the backstage retained exactly the same components of a typical blueprint: invisible contact, employee actions, line of internal interaction, and support processes. Two adaptations were applied to the onstage. First, the section of physical evidence was removed from the top and integrated in the same section of touch-points and staff activities. The intention was to concentrate the focus on user actions at the top of the blueprint, but also it was considered that physical evidence might be integrated in that section in order to simplify the blueprint to be better understood by the stakeholders. Second, the line of interaction was used to represent the level of difficulty in using the service by younger and older people, and the gap between what users need and what service organisations do.

Onstage	Journey Stages	
	Customer actions	
	Level of difficulty Gap between user capabilities and task demand * Main barriers for interaction	Line of Interaction
	Visible contact Employee actions Physical evidence	Line of Visibility
Backstage	Invisible contact Employee actions	Line of Internal Interaction
	Support Processes	

Figure 8.1 Inclusive service blueprint structure

An additional section was used below the blueprint to describe the main barriers in using the bus service (see Figure 8.2). This section was needed to facilitate a better communicating of the issues that impede interaction with each service touch-point. Thus, for each user action represented in the horizontal axis, a correspondent list of barriers was described. Based on earlier literature on this subject (Nickpour et al., 2012), the main barriers were presented and classified as psychosocial, physical, and from service operation.

* Main barriers in using the bus service	Psychosocial	
	Service operation	
	Physical	

Figure 8.2 Section to describe the barriers for interaction

Finally, as the blueprint was prepared for the service stakeholders, special consideration was given to the use of images and colours in designing the blueprint. According to Segelström (2009) there is a difference in nature of the visualisations used in a blueprint according to who is meant to view them: external people or the design team.

Visualisations for clients or stakeholders are usually simpler and more aesthetically appealing. Consequently, with the intention of increasing simplicity and attractiveness in the blueprint, the user actions and some touch-points were represented through the use of images. Colours were used for attractiveness, but also to clearly differentiate sections within the blueprint. Design criteria including simplicity, visibility, legibility and readability, and colour harmony were considered in using colours and images. To follow these criteria and because the bus service comprised several stages and user actions, a format A0 was used to design the actual blueprint representation. Initially the inclusive service blueprint was developed using Microsoft excel, but during the final design stages Adobe illustrator CS6 was also used.

8.4.2 Design of the content

In terms of content, the bus service was divided into seven stages, which have been defined based on the literature review (Nickpour et al., 2012; Tyler, 2002) and used as part of the study with the accompanied journeys method (Chapter 7). Similarly, the blueprint included the user actions that have been identified from the studies in chapter 6 and chapter 7. Only general actions for each stage were included, because too much detail in a service blueprint can diminish its ability to provide a useful overview (Polaine et al., 2013). Touch-points, driver actions, and physical evidence were defined based on the results from chapters 6 and 7, while data to complete the backstage (employee actions and support processes) came from the interviews and meetings undertaken for the study in chapter 4 and some data from chapter 6 (e.g. bus design).

The key elements of this inclusive service blueprint included:

- The level of difficulty in using the bus service for younger and older people,
- The gap between what service organisations do and what these group of users expect or need (ideal service), and
- The main barriers in using the service for specific user groups.

The first two elements were represented through lines located between the user actions and employee actions (in the line of interaction) while the main barriers were included in a separate section below the blueprint.

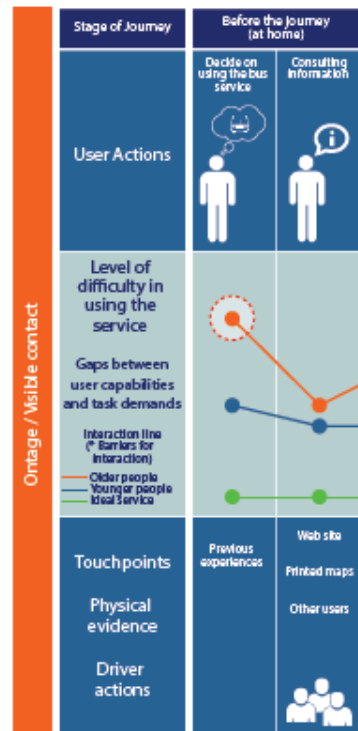


Figure 8.3 Representation of the level of difficulty in using the service

The inclusion of these components was based on both qualitative and quantitative data from the studies with younger and older people reported in Chapter 5, 6, and 7.

To define the level of difficulty the notion of the gap between user capabilities and task demand was used. To visualise this, a line was used to represent an ideal service (see Figure 8.3). The ideal service was defined as one where the user capabilities fit well with the task demand. At that point, a scale from one to 10 was built to represent the level of difficulty associated with using the service, in which the number 1 was assigned to represent the ideal service, and the number 10 represented the moment with the highest level of difficulty in using the existing service. Thus, the proximity between level of difficulty and the ideal service was intended to indicate the gap between user capabilities and task demand. The larger the distance between these points, the less usable, safe and desirable was the service for younger and older people.

The level of difficulty was estimated based on what participants raised as a problem related to each interaction point (Chapters 5 and 7), and what was observed by the

researcher (Chapter 6). This represented the extent to which the individual has the capabilities to undertake a particular action given the demands imposed by that aspect of the bus service. A rigorous process was followed to estimate the level of difficulty in using the service by younger and older people. However, rather than focussing on the absolute values, the most important consideration was to make evident the differences between younger and older passengers in terms of the gap between their capabilities and needs and the demand that actual service exerts. Table 8.1 shows criteria included to estimate the level of difficulty in using the service.

Table 8.1 Factors used to establish the level of difficulty in using the service

Factors	Reasons
Percentage of participants who mentioned an issue related to a particular action or touchpoint in the focus groups study	Since participants in the study were asked to identify the problematic issues that impose greatest difficulty in using the service, the results provide a prioritisation of problems according to the level of difficulty in using the service. Thus, a higher percentage of participants talking about a specific issue led to an estimation of a higher level of difficulty for specific action.
Percentage of participants who mentioned an issue related to a particular action or touch-point in the accompanied journey study	Participants in the study were asked to talk about the problems in using the service. A higher percentage of participants talking about a specific issue led to an estimation of a higher level of difficulty for specific action. In this case the study only provided information on older passengers.
Qualitative and quantitative data from the observational study (Chapter 6)	This study provided qualitative and quantitative data to measure and to determine differences between user capabilities and task demands. These measurements were useful for estimating level of difficulty and differences in the gap between younger and older capabilities and the demand that each point of interaction imposed on them.
If the issue was related to actual or perceived safety or comfort	Given that in a needs hierarchy ‘safety and well-being’ is more important than ‘pleasure’ (Bonapace, 2002), safety issues were given a higher estimation than those related to comfort. This estimation was based on the results of all three studies.
When possible data from literature, if any, about the level of demand was used of that specific task	Literature provides information about the level of demand that a specific task imposes to a person according to his/her capabilities. This literature focusses mostly in older people. This helped to reinforce the estimation based on the results of this research.

The procedure that was followed to determine the level of difficulty is described below. To illustrate this process, the alighting stage is used, and particularly the action of ‘climbing down the stairs’, which comprises the highest level of difficulty for older people.

1. The percentage of participants in the focus group study (Chapter 5) that raised an issue (or issues) related to each action or stage of the journey was identified.

Table 8.2 shows the percentage of younger and older participants that expressed any issues and concerns for the action of climbing down the stairs:

Table 8.2 Issues and concerns related to climbing down the stairs

	Younger people n =17	Older people n =26
Problems in alighting the bus	12%	62%
Perception of being at risk	41%	100%
Short time for alighting	53%	69%
Too high steps	24%	73%
Large distance between the kerb and the bus step	0%	31%
Poor design of steps (bent shape)	6%	27%
Feeling safer using the front door for alighting	0%	39%

2. Data from the observational study (Chapter 6) related to each particular action and stage of the journey was considered, in order to contribute to the difficulty judgements. Observed behaviour associated with climbing down the stairs suggested significant differences between younger and older people. Older people took longer to complete this action; they were actively using strategies to minimise the risk of losing their balance and potentially falling, e.g. most of older passengers climbed down the stairs placing both feet on each stair; in comparison, young passengers rarely exhibited that behaviour. Most of older people (70.7%) alighted from the bus by the front door, which was interpreted as a protective behaviour because they did not feel safe using the back door, since they believed that drivers were not able to observe when passengers are alighting. In contrast, the majority of young people (81%) did get off the bus using the rear door.
3. Data relating to older participants from the accompanied journeys study (Chapter 7) were used to corroborate the level of difficulty of each action for this group of users. In the action of climbing down the stairs all the participants expressed experiencing fear of falling due to being under time pressure, and because steps and handrails were poorly designed.

4. Literature was considered, to understand the level of demand of each action. It is suggested that descending stairs is a very demanding task for older people, even more than ascending (Reid et al., 2011; Startzell & Owens, 2000). Furthermore, it is important to consider that accidents seem to occur more frequently during stair descent than during ascent (Startzell & Owens, 2000).
5. After the analysis of the data described in 1-4 above, a difficulty score between one to 10 was estimated for each group of participants in relation to the specific activities and drawn on the blueprint. Ultimately this was a personal judgement by the researcher, and the potential limitations of this approach are discussed in Section 8.5.2 .

Additionally, the blueprint content also indicates the actions along the journey with a higher level of difficulty. To visualise this, a dotted circle was used that surrounded the point that indicated the level of difficulty for the action. Additionally, a question mark surrounded by a circle was used to represent the moments with more uncertainties for passengers (see Figure 8.4).

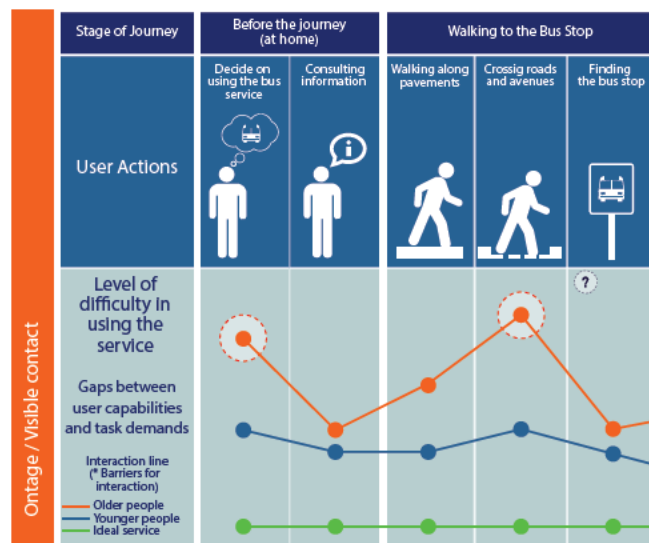


Figure 8.4 Representation of actions with higher difficulty

8.5 Final Inclusive Service Blueprint

8.5.1 Key features of the blueprint

The development of the *inclusive* service blueprint aimed to help in visualising and communicating to the stakeholders insights on the actual characteristics of bus service, but especially the gaps between what service providers do and what younger and older users expect or need according to their abilities. Figure 8.5 and Figure 8.6 show a typical blueprint and the inclusive version, respectively. A detail comparison between them allows identifying the following key features from the inclusive blueprint:

- It illustrates the difference on younger and older people's experience and needs in using the bus service,
- It visualises differences in the level of difficulty using the service for younger and older people,
- It provides a means for contrasting the ideal service and user experience within the existing service,
- It helps in demonstrating visually how the gap between personal abilities and environmental demands become wider for older people.
- It suggests that in addressing older people's needs in improving the service, the needs of younger people might be considered as well,
- It shows the points of interaction associated with higher level of difficulty, particularly for older users; and therefore it provides a set of priorities for designing a more inclusive bus service.
- In addition, it provides the main barriers that need to be addressed in order to reduce difficulties for users and to increase uptake of the service.

The final blueprint was designed and presented in A0 size. Given this size, the blueprint is presented first in a small full version (Figure 8.6), and then divided in several parts to allow it to be easily read (from Figure 8.7 to Figure 8.14).

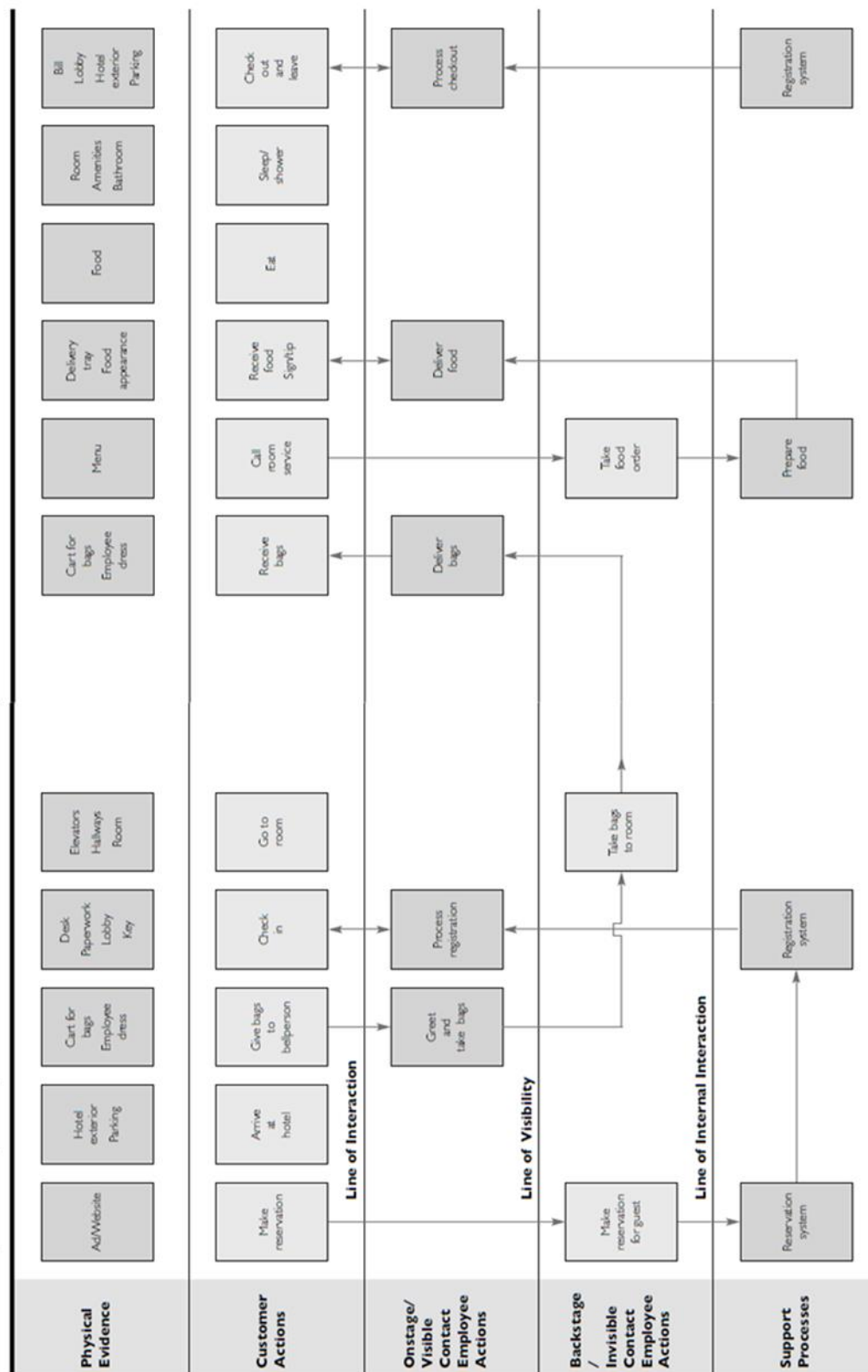


Figure 8.5 A typical blueprint for overnight hotel stay service (Bitner et al., 2008)

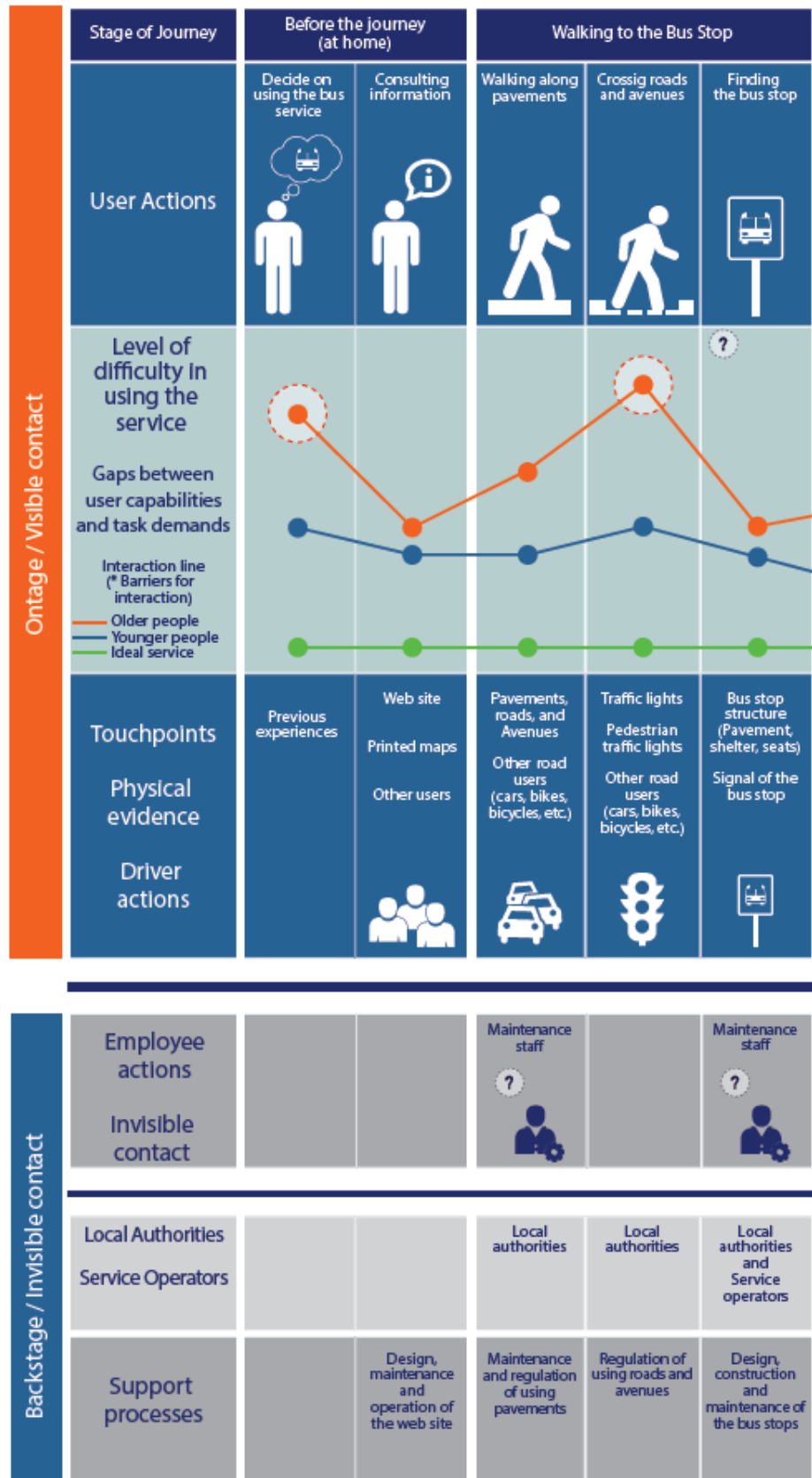
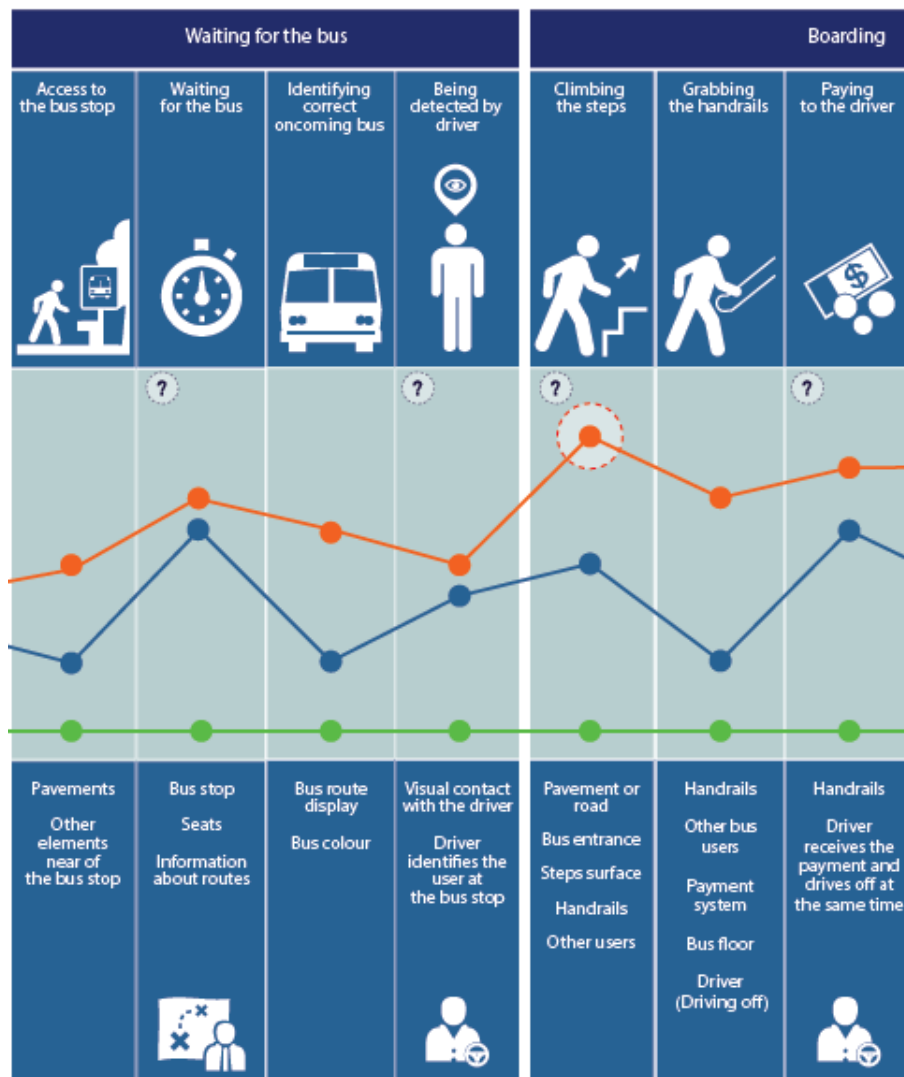


Figure 8.7 Sections from the inclusive service blueprint



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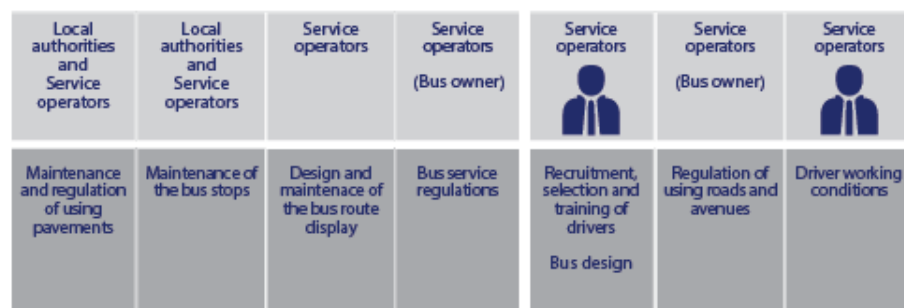
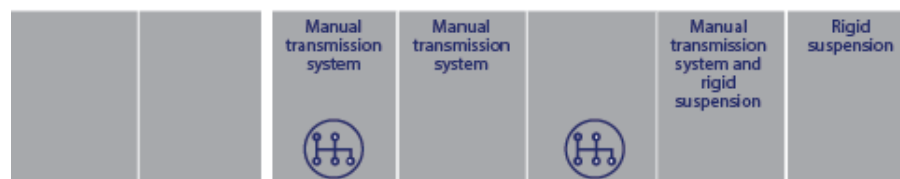


Figure 8.8 Sections from the inclusive service blueprint (cont.)



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iteration line

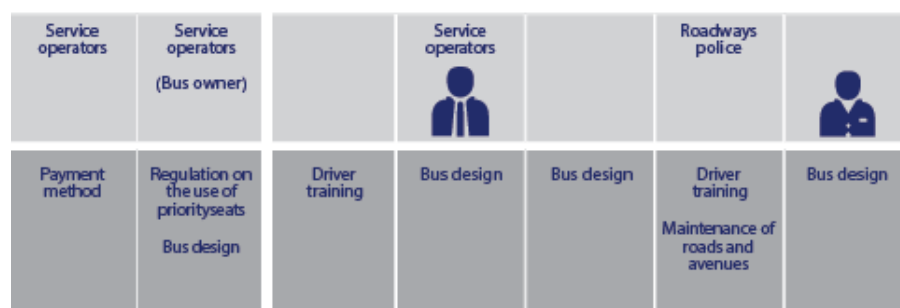


Figure 8.9 Sections from the inclusive service blueprint (cont.)

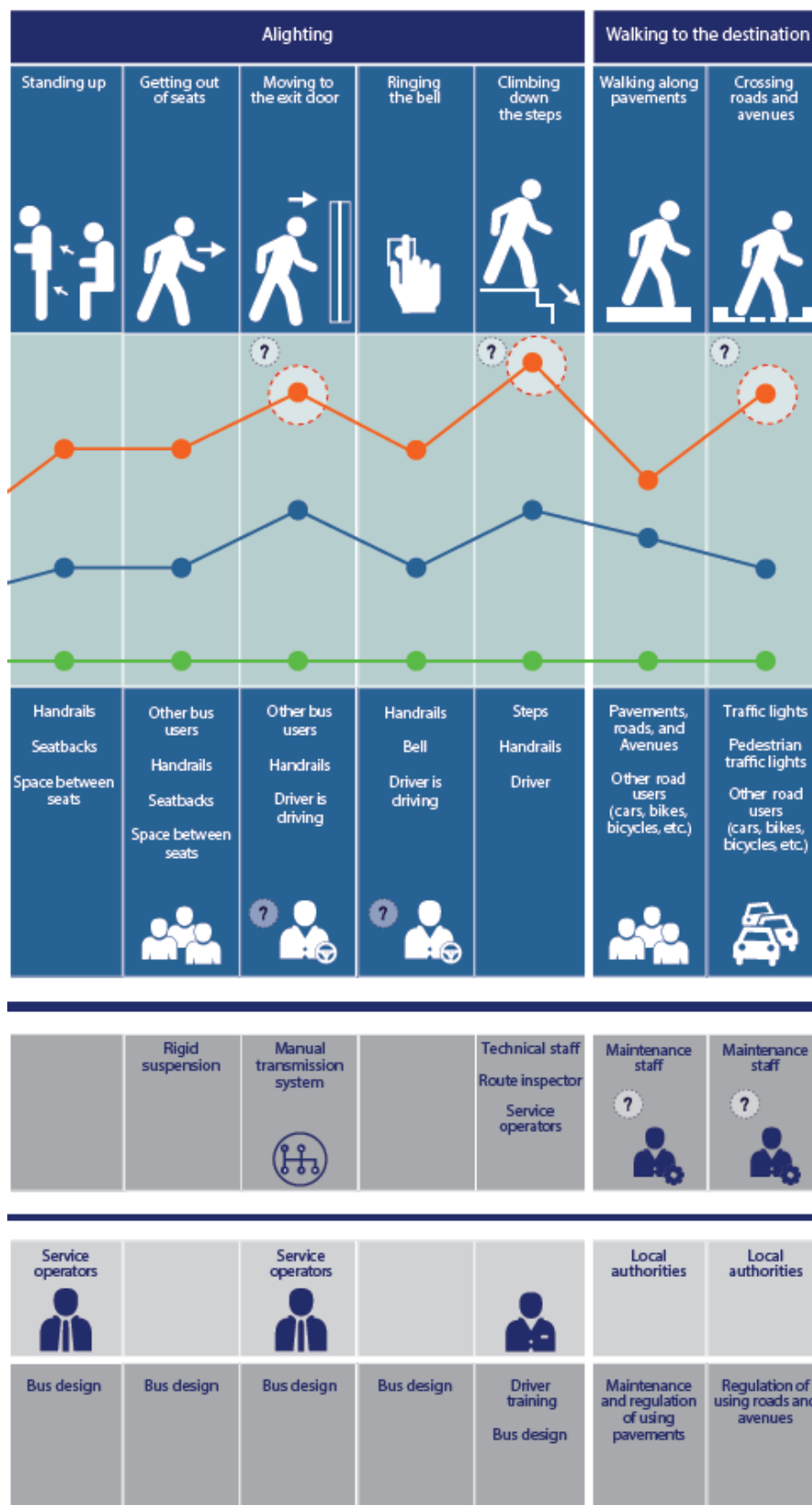


Figure 8.10 Sections from the inclusive service blueprint (cont.)

	Stage of Journey	Before the journey (at home)		Walking to the Bus Stop		
Main barriers in using the bus service	Psychosocial	Concerns over being physically hurt at some stage whilst using the bus service Perception of lack of quality in the service		Fear of falling due to poor pavement conditions Perception of being at risk due to crime (especially at night)	Fear of being run over by traffic Lack of consideration from other road users towards pedestrians	Uncertainty about whether the bus stops at that "bus stop"
	Service operation		Lack of information or designed inappropriately		Lack of traffic regulation	Lack of information related to where the bus stops are
	Physical			Long distances Lack of pavements Pavements in bad conditions or presence of obstacles	Lack of pedestrian traffic lights Large amount of traffic Cars turning right continuously	Vehicles obstructing the bus stop

Figure 8.11 Main barriers in using the bus service

Waiting for the bus				Boarding		
Fear of falling	Uncertainty over how long it is necessary to wait for the bus Perception of being at risk due to crime especially during nights	Difficulties to identify the coming bus due to poor design of the bus route display	Uncertainty over if driver wants to stop and collect passengers	Fear of falling or not being able to climb the steps Feelings being under time pressure		Uncertainty about the attitude of the driver
Lack of official bus stops	Lack of timetables Frequently drivers do not want to stop and collect passengers Crowded buses	Bus rapidly approaching	Frequently drivers do not want to stop and collect passengers Crowded buses	Crowded buses Short time for boarding Unfriendly drivers	Drivers drive off before passengers are safely located in the bus	Inappropriate fare payment system Drivers are not well-trained
Presence of obstacles	Lack of suitable bus stops	Poor design of the bus route display	Vehicles obstructing the bus stop force bus users to wait the bus outside of pavements	Long distance between the bus step and the kerb Steps height Steps with irregular shapes	No or inappropriately placed handrails	

Figure 8.12 Main barriers in using the bus service (cont.)

Travelling						
Fear of falling due to erratic movements of the bus	Lack of consideration towards older passengers	Perception of being at risk of falling	Discomfort caused by disturb other passengers	Perception of being at risk due to the manner in which the bus is driven	Fear of falling	Difficulty to see and understand maps located inside the bus
Driver drives, takes the payment, gives tickets while driving	Crowded buses	Unstable Journey Crowded buses	Unstable Journey	Driving style and unstable journey	Driving style and unstable journey	Crowded buses poor location of priority seats
		No or inappropriately placed handrails Narrow hangways	Reduced room to get into the seat Other users seated in the aisle seat	Bus design (transmission, suspension)	Bus design (transmission, suspension)	

Figure 8.13 Main barriers in using the bus service (cont.)

Feelings of being under time pressure to alight the bus	Discomfort caused by disturb other passengers	The critical need for the use of the front door to avoid being hurt	Problems to be heard by the driver	Fear of falling due to being under time pressure and poorly designed steps and handrails	Fear of falling inappropriately use of pavements by other road users	Fear of being run over by traffic Lack of consideration from other road users towards pedestrians
Driving style and unstable journey	Crowded buses Driving style and unstable journey	Crowded buses Driving style and unstable journey	Only one bell in the bus	Drivers do not allow passengers alighting by the front door Pressure for passengers to alight faster		Lack of traffic regulation
	Reduced room to get off the seat Other users seated in the aisle seat	No or inappropriately placed handrails Narrow hangways	Poor location of the bell (Too high for some passengers and located near to the rear door)	Steps too high and poorly designed No or inappropriately placed handrails Difficulties for posture control	Long distances Lack of pavements Pavements in bad conditions or presence of obstacles	Lack of pedestrian traffic lights Large amount of traffic

Figure 8.14 Main barriers in using the bus service (cont.)

8.5.2 Limitations of the inclusive blueprint development

It could be argued that the overall procedure behind the estimation of the level of difficulty in using the service lacked rigour, since it was based on the personal judgement of the researcher. This might lead to, for some actions, the level of difficulty for younger or older people being overrated or underrated.

However, a blueprint as a visualisation tool is an abstract description of the current state of the service that is used for translating raw data into insights. This relates to the data collected and serves as a link between user research and the actual design work (Segelström & Holmlid, 2009). Furthermore, as stated in Section Chapter 8.4.2, a defined process was followed to estimate the level of difficulty in using the service based on the results of the previous studies. The specific intention was to build the notion of the gap between their capabilities and needs and the demand that an actual service exerts.

All in all, it is argued that the blueprint presents research data in such a way as to provide relevant insights to improve the design of the bus service for both, younger and older people. This is in line with Segelström & Holmlid (2009:6) who argue that visualisation techniques ‘are not used as simple tools to map and describe what is, but rather serve the purpose of interpretation and understanding’.

The following chapter describes the evaluation of the blueprint, based on a series of workshops with stakeholders, and feedback from local media in Guadalajara, Mexico.

Chapter 9 Assessing the usefulness of the inclusive service approach for improving the bus service

9.1 Introduction

At the outset of this research, it was assumed that the integration of Service Design and Inclusive Design, guided by a human factors perspective, could contribute to designing inclusive services. Therefore the overall aim of this research was to integrate these design approaches in creating an inclusive service approach to investigate the use of the bus service by younger and older people, and a specific objective was to develop a tool to support the process of designing for a more inclusive service.

At the first stage of this research (the ‘Discover’ as outlined in Section 1.6), the use of this approach led to the application of four descriptive studies (Chapters 4, 5, 6, and 7). The analysis of data collected from these studies facilitated: an understanding of the service operation from multiple stakeholder perspectives; the identification of the main barriers in using the service; and determination of the service gap between what younger and older people need and desire and what bus operators provide. In the second stage of this research (the ‘Translate’ as outlined in Section 1.6), the use of synthesised findings from the above studies provides the foundation for developing an inclusive service blueprint. This blueprint graphically represents the current service provision and highlights areas for improvements (Chapter 8) – i.e. it is a tool that can be used for service improvement.

This chapter describes the rationale, development and results of a series of workshops with bus service stakeholders. These workshops were designed to assess the usefulness of (1) the inclusive service design *approach* for analysing and enhancing the bus service and additionally (2) the inclusive service *blueprint* for communicating results from the descriptive studies. For the purpose of this study, usefulness is understood as the value of the product for the user and deals with issues regarding functionality of the product, as suggested by Nickpour & Dong (2011).

9.2 Aim and objectives

This study investigated the usefulness of the inclusive service design approach for enhancing the bus service from the main stakeholders' perspective; additionally, it also determined the usefulness of the inclusive service blueprint for communicating user data and the features of the current service provision to the bus service stakeholders. To achieve this, the study was guided by the following objectives:

- To present and assess the inclusive service design approach as an alternative for service improvement,
- To improve understanding of:
 - a) The value of designing for a more inclusive bus service,
 - b) Differences in capabilities and needs between younger and older bus users,
 - c) The difference in how problematic issues impact younger and older passengers' travelling experience,
 - d) The factors that are critical in meeting the users' needs, particularly for older passengers, and
 - e) The relevance of considering all the elements of a door-to-door journey
- To evaluate the usefulness of the inclusive service blueprint for communicating:
 - a) The actual service provision
 - b) The user data
 - c) Differences in capabilities and needs between younger and older users
 - d) Critical points in using the service
- To evaluate the usefulness of the approach and blueprint in providing a common platform for discussion of the service, and generating ideas for service improvement.

9.3 Study rationale

Since the aim of this study was to investigate the potential usefulness of the inclusive service design approach for enhancing the bus service, and more specifically the usefulness of the inclusive blueprint for communicating user data and the current service provision, a series of workshops with stakeholders were used to achieve this purpose. As stated in the literature review (section 2.3.2) the inclusion of stakeholders in the process of service design or service improvement is imperative (Polaine et al.,

2013; Stickdorn, 2010a) because each stakeholder group has something to contribute to the service improvement. In addition, because the overall aim of this research project was also to contribute to the improvement of the actual bus service, service stakeholders were the focus of this study. They were considered to be the most well-informed about the service provision, because actually they are, consciously or not, the designers of the service. Consequentially, this study recruited participants from the following stakeholder groups: a bus manufacturing company, bus operators, bus drivers, local authorities, and Non-Governmental Organisations (NGOs). Additionally, a group of design students was incorporated in this study because designers have been highlighted as one of the main groups interested in knowledge of inclusive design (Dong et al., 2013), and designers are likely to be involved in the process of future service improvement.

9.4 Method

9.4.1 Overview

In order to evaluate the usefulness of the inclusive service design approach, this study comprised a series of evaluation workshops with service stakeholders. An evaluation workshop consists of users and developers meeting together and the user representatives try to use the design outcome while designers observe (Maguire, 2001). Workshops have been used previously in evaluating the tools used in inclusive design (Dong et al., 2013; McGinley & Dong, 2009). These workshops included an explanation of the inclusive service design approach, and the presentation of the inclusive service blueprint by the researcher. Two questionnaires were used for data collection. One was to evaluate the design approach and the other aimed to evaluate the blueprint. Additionally, workshops were audio recorded in order to capture ideas coming from the discussion among participants. The results are discussed in terms of how the approach and blueprint might offer benefits for service improvement.

9.4.2 Participants

The study recruited a number of bus service stakeholder groups, who were selected and invited to participate in a workshop. The study was particularly interested in those who might be involved in making decisions on the service provision (as described in Chapter 4). Accordingly the sample in this study included people from bus manufacturers, local authorities, service providers, drivers, NGOs, and design students. Table 9.1 provides a

list of the stakeholder groups, and the number of participants who took part in each workshop.

Table 9.1 List of stakeholder groups who took part in this study

Organisation Name (in Spanish)	Type of organisation	Expected views from each stakeholder group	Number of participants
Beccar Carrocerias	Bus manufacturers	Bus manufacturing limitations based on cost Bus design based on legislation	17
Operadores del FUCSEJ	Service operators	Costs of running the service Government quality targets and fare restrictions Competition from other bus operators	5
Instituto de Movilidad y Transporte	Local Authority – looking after Transport	Difficulties regulating the transport system Knowledge of legislation	6
Dif Jalisco and Dif Zapopan	Local Authority - looking after older people	Potential to benefit older people's quality of life	9
Choferes del FUCSEJ	Drivers	Pressure to maximise passenger numbers Conflicts with passengers Impact of traffic conditions Working conditions Training requirements and provision	29
Plataforma Metropolitana para la Sustentabilidad	Group of NGOs	Quality of life improvements by reducing traffic and pollution	4
Estudiantes de la Maestria en Ergonomia, Universidad de Guadalajara	Designers enrolled in a master of Ergonomics	Conceptual design of future services Implications of applying Ergonomics principles	10

9.4.3 Materials

The main materials used in the workshops comprised the inclusive service blueprint described in Chapter 8, a presentation to explain the inclusive service design approach, and two questionnaires for evaluating the approach and blueprint. The next subsections describe the contents in the presentation and the development of the questionnaires.

9.4.3.1 Power point presentation of the approach

In order to guide the workshops a power point presentation was used (see Appendix J). This presentation comprised slides to present an overview of the inclusive service design approach as well as the methods and part of the results of the studies undertaken in the first stage of this research project. More specifically the presentation contained:

- Names of the workshop, researcher and supervisors,
- Aims of the research project,
- Background of the research project,
- Objectives of the workshop,
- A diagram of the inclusive service design approach,
- A brief explanation of the underpinning approaches: Human Factors, Inclusive Design and Service Design,
- An explanation of the stages in the design process through the double diamond design process,
- A explanation about ‘who the service users are’,
- Methods and some results of the descriptive studies,
- An introduction to the Inclusive Service Blueprint.

9.4.3.2 Questionnaires

At the workshops the participant were asked to fill out two questionnaires (see Appendices K and L). The questions in the questionnaires were developed in order to address the objectives outlined in Section 9.2. The first questionnaire included questions for evaluating the usefulness of the inclusive service design approach for service improvement. The other questionnaire was designed to evaluate the usefulness of the blueprint as a tool for communicating the older and younger passengers’ travelling experience and the features of the current service provision.

The questionnaire was developed as a paper-based survey that was self-administered by the participants in the workshops under supervision and support (if necessary) from the researcher. These questionnaires were formulated and implemented in Spanish and translated into English for this chapter. Each questionnaire comprised a series of items to be answered using tick boxes (where only one from a number of different answers could be selected) and two open ended questions to enter either knowledge or opinions from participants. These questions had mostly the intention to corroborate somehow

what participants were responding in the closed ended question. A rating scale with three types of anchors was used for those items with tick boxes. These anchors were: 1) 'strongly disagree', 'disagree', 'slightly disagree', 'neutral', 'slightly agree', 'agree', and 'strongly agree'; 2) 'Not useful' and 'very useful'; and 3) 'No, definitely' and 'Yes, definitely'. The rating scale was from one to seven, where one represented the negative values ('strongly disagree', 'not useful' and 'no, definitely') and seven the positive values ('strongly agree', 'Very useful' and 'Yes, definitely')

Overall, the questionnaires comprised the following sections:

Questionnaire 1_ Assessment of the use of inclusive service design approach

- The value of designing for a more inclusive bus service
- Increasing understanding of users' differences, experience, and needs
- Increasing understanding of the key issues that are critical in meeting the needs of users
- Increasing understanding of how the current bus service design has a different impact on younger and older passengers' experience
- New learning reported by stakeholders in relation to the users' experience and service features
- Increasing understanding the relevance of considering all the elements of the bus service
- Usefulness of providing a common platform for the discussion of the service improvement
- Usefulness for generating ideas and identifying opportunities for improving the service

Questionnaire 2_ Assessment of the use of inclusive service blueprinting

- Usefulness for visualising and communicating the older and younger passengers' travelling experience and the features of the current service provision
- Usefulness for providing a common platform for discussion of the service improvement
- Usefulness for generating ideas and identifying opportunities for improving the service
- Exploring whether stakeholders might consider using this blueprint in the future for service improvement.

9.4.4 Procedure

9.4.4.1 Participants recruitment

An invitation to participate in a workshop was made via phone and/or email to a member of each of the stakeholder groups. In most of the cases that member was the person who had previously participated in the interviews for the study in Chapter 4. The invitation described how the workshops presented the results from the descriptive studies (Chapters 4 to 7) as well as an approach and a tool for service improvement. The requested number of participants for each workshop was between four and eight. However, in some cases it was suggested by the stakeholder group to invite a higher number of people; such was the case for drivers, the bus manufacturing company and design students. Workshops were undertaken in locations that belonged to or were familiar for each stakeholder group.

9.4.4.2 Running the workshops

At the beginning of the workshops participants were asked to write briefly - on the first page of the first questionnaire - their knowledge of the problems that older people face when using the bus service. After that each workshop comprised four stages. During the first stage, the researcher presented the contents of the power point presentation described in Section 9.4.3.1 . After that, the inclusive service blueprint in a large format (A0) was shown to the participants (see Figure 9.1), and they were asked to observe and familiarise themselves with it for about 10 minutes. Subsequently, participants were asked to complete both questionnaires. During the final stage, participants were encouraged to express personal points of view about the usefulness of the approach for improving the service, but also whether there were limitations in its use and application. Each workshop lasted around 1.5 hours, were captured via digital audio recording and partially transcribed to extract the participants' points of view on the approach and blueprint.



Figure 9.1 Presentation of the Inclusive Service Blueprint

9.4.4.3 Data analysis

This study produced data in different formats, including quantitative and qualitative outputs from questionnaires, and audio recordings from the workshops discussions. Therefore a variety of methods for data analysis were required. Data from the questionnaires and workshop discussion were analysed using the following procedure:

Qualitative data from questionnaires and workshop discussion

Qualitative outputs from questionnaires and discussions were captured and thematically analysed using Nvivo software. An inductive approach was used for the analysis, which means the themes identified are strongly linked to the data themselves. The analysis was also done at a semantic and realistic level, which means that themes and codes were identified within the explicit meaning of the data, considering only what participants wrote or said; as opposed to a latent or interpretative level, in which the analysis starts to examine *underlying* ideas, assumptions, conceptualizations and ideologies (Braun & Clarke, 2006).

Quantitative data from questionnaires

Quantitative data collected via the questionnaires were transferred to a basic Excel data file. Variables were defined and coded, and then data were imported into, and analysed using, SPSS (v. 20). All analysis within SPSS was undertaken using the syntax facility; a table with the variables and the full syntax coding that was developed are shown in Appendices M and N. A process of screening and cleaning was undertaken before

analysing data. The process consisted of a descriptive analysis for categorical and ordinal variables to spot possible errors such as a number 11 within variables coded with one to seven.

A descriptive analysis identified that data were non-normally distributed and negatively skewed due to the relatively small number of low data values. The median was chosen as the measure of central tendency because is unaffected by stream scores (Howell, 2010), and it is a suitable measure on an ordinal scale. Due to their usefulness in showing the median and distribution of non-normally distributed data, boxplot charts were used to display the results from each question/variable included in the questionnaires. Kruskal-Wallis statistics are given where appropriate to indicate significant differences ($p < 0.05$) between stakeholder groups for specific responses.

9.5 Results

The following sections present these results in a sequence that corresponds to the order in which data were collected in the workshops, as follows:

1. Participant demographics and their previous awareness of problems that older people face when using the service,
2. Participant assessment of the usefulness of inclusive service design approach,
3. Participant assessment of the usefulness of the inclusive service blueprint, and
4. Participants' verbal feedback on the inclusive service design approach and the blueprint tool.

9.5.1 Participants' demographics and previous knowledge

In this study a total of 80 people took part in seven workshops. Participants belonged to different stakeholder groups, as described in section 9.4.2 . The sample comprised 61 male and 19 female distributed along the groups (as shown in Figure 9.2), with the exception of the drivers group which comprised only males.

At the beginning of the sessions, participants were asked to write down what they thought were the problems that older people face when using the bus service. The intention of this question was to verify whether they had learnt something new after the workshop. Table 9.2 summarises what participants reported as their prior knowledge about these problems. The right column in the table shows how many participants reported a specific problem.

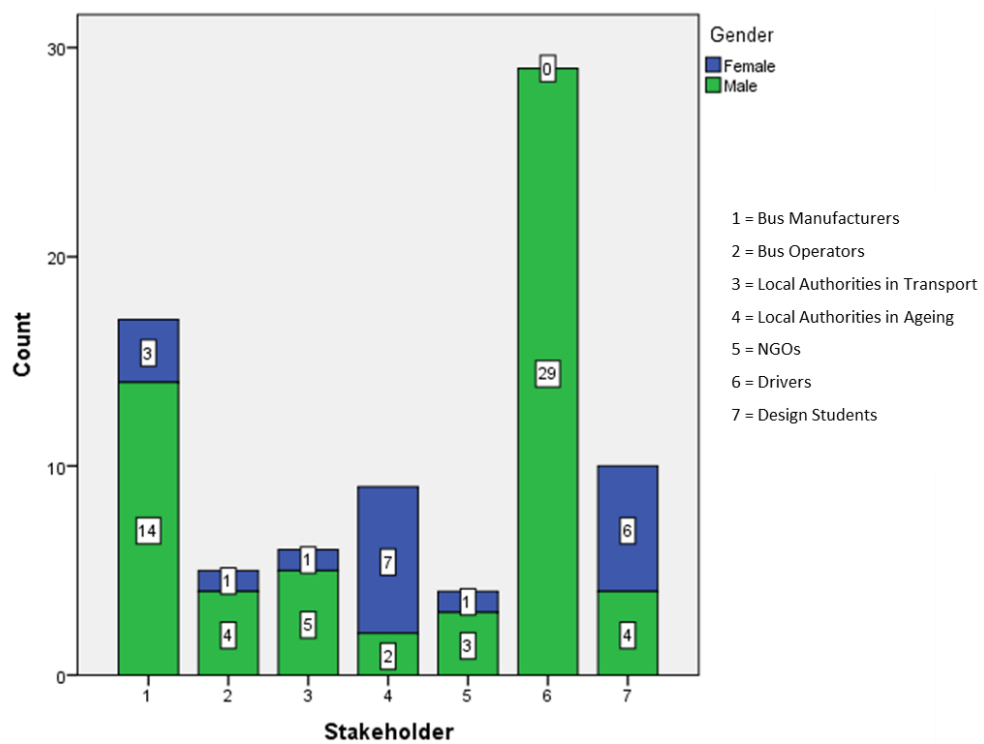


Figure 9.2 Number of participants and gender, by stakeholder group.

Table 9.2 Summary of participants' previous knowledge

Stakeholder group	Faced problems by older people	
Bus manufacturers (n= 17)	• Steps too high	15
	• Few priority seats and not being given to them	11
	• Seats and handrails poorly designed	6
	• Lack of patience and consideration from drivers	5
	• Difficulty in maintaining balance because bus is moving	3
	• Short time for boarding and alighting	1
Bus operators (n= 5)	• Steps too high	3
	• Older people have problems because their disabilities	3
	• Difficulty in maintaining balance because bus is moving	2
	• Safety is not guaranteed	2
	• Problems to identify the bus route	2
	• Lack of a person who look after them	1
	• Short time for boarding and alighting	1
Local authorities in transport (n= 6)	• Steps too high	5
	• Driver do not want to receive <i>transvales</i> (travel pass)	4
	• Unreliable and uncomfortable service	2
	• Safety is not guaranteed	2
	• Seats and handrails poorly designed	1
	• Lack of patience and consideration from drivers	1
	• Lack of consideration from other users	1
Local authorities in ageing (n= 9)	• Lack of patience and consideration from drivers	8
	• Steps too high	7
	• Lack of consideration from other users	3
	• Older people suffer from several illness/disabilities	2
	• Driver do not want to receive <i>transvales</i> (travel pass)	2
	• Long distances	2
	• Crowded buses	2
	• Lack of handrails	1
NGOs (n= 4)	• Steps too high	3
	• Lack of patience and consideration from drivers	2
	• Few priority seats and not being given to them	2
	• Driver do not want to receive <i>transvales</i> (travel pass)	1
	• Unreliable service	1
Drivers (n= 29)	• Problems to identify the route number and steps	18
	• Older people have problems to get on the bus and move through the bus	14
	• Steps too high	14
	• Older people suffer from several illness/disabilities	12
	• Older people are too slow because their disabilities	7
	• Lack of a person who look after them	7
	• Lack of patience and consideration from drivers	6
	• Lack of consideration from other users	4
	• Difficulty in maintaining balance because bus is moving	4
Design students (n= 10)	• Steps too high	7
	• Information poorly designed	4
	• Problems to identify the bus route	3
	• Difficulty in maintaining balance because bus is moving	3

• Lack of patience and consideration from drivers	2
• Mobility problems	1
• Long distances	1
• Safety is not guaranteed	1
• Cognitive problems	1

9.5.2 Usefulness of the inclusive service design approach

Graphs present data in relation to the general question at the top of the Figure 9.3, based on response to the specific statements below each boxplot.

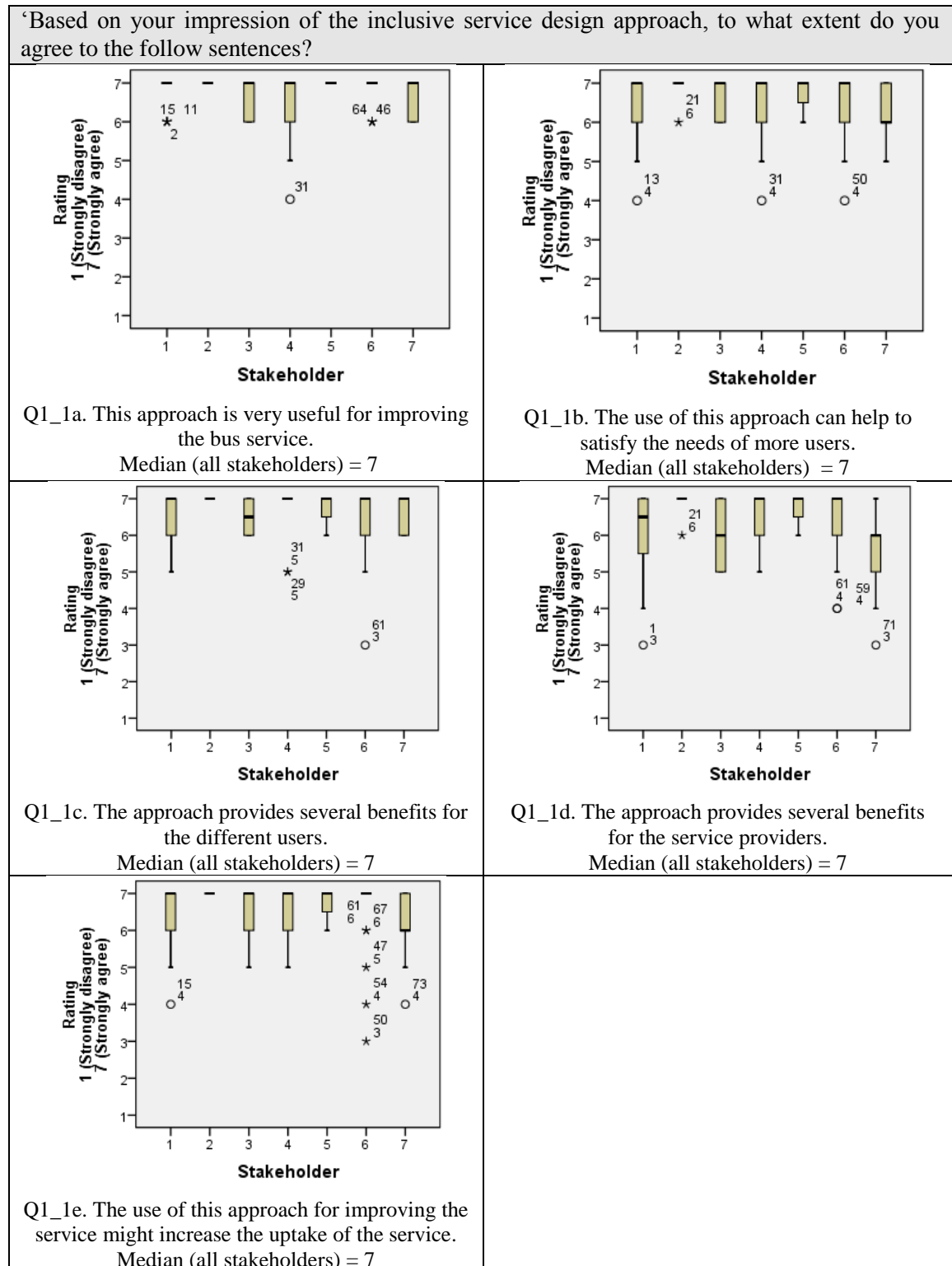


Figure 9.3 Boxplot for each question, assessing the approach
(1: Bus manufacturers, 2: Bus operators, 3: Local authorities in transport; 4: Local authorities in ageing, 5: NGOs, 6: Bus drivers, 7: Design students).

9.5.3 Improving understanding

9.5.3.1 The value of designing for a more inclusive bus service

Graph presents data in relation to the statement ‘. I have gained a better understanding of the value of designing for a more inclusive bus service’:

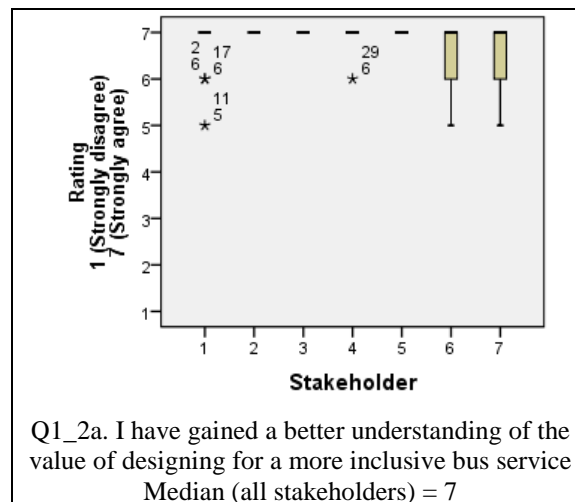


Figure 9.4 Boxplot for each question, the value of designing an inclusive service
(1: Bus manufacturers, 2: Bus operators, 3: Local authorities in transport; 4: Local authorities in ageing, 5: NGOs, 6: Bus drivers, 7: Design students).

9.5.3.2 The differences between younger and older users

Graphs present data in relation to the general question at the top of the Figure 9.5, based on response to the specific statements below each boxplot.

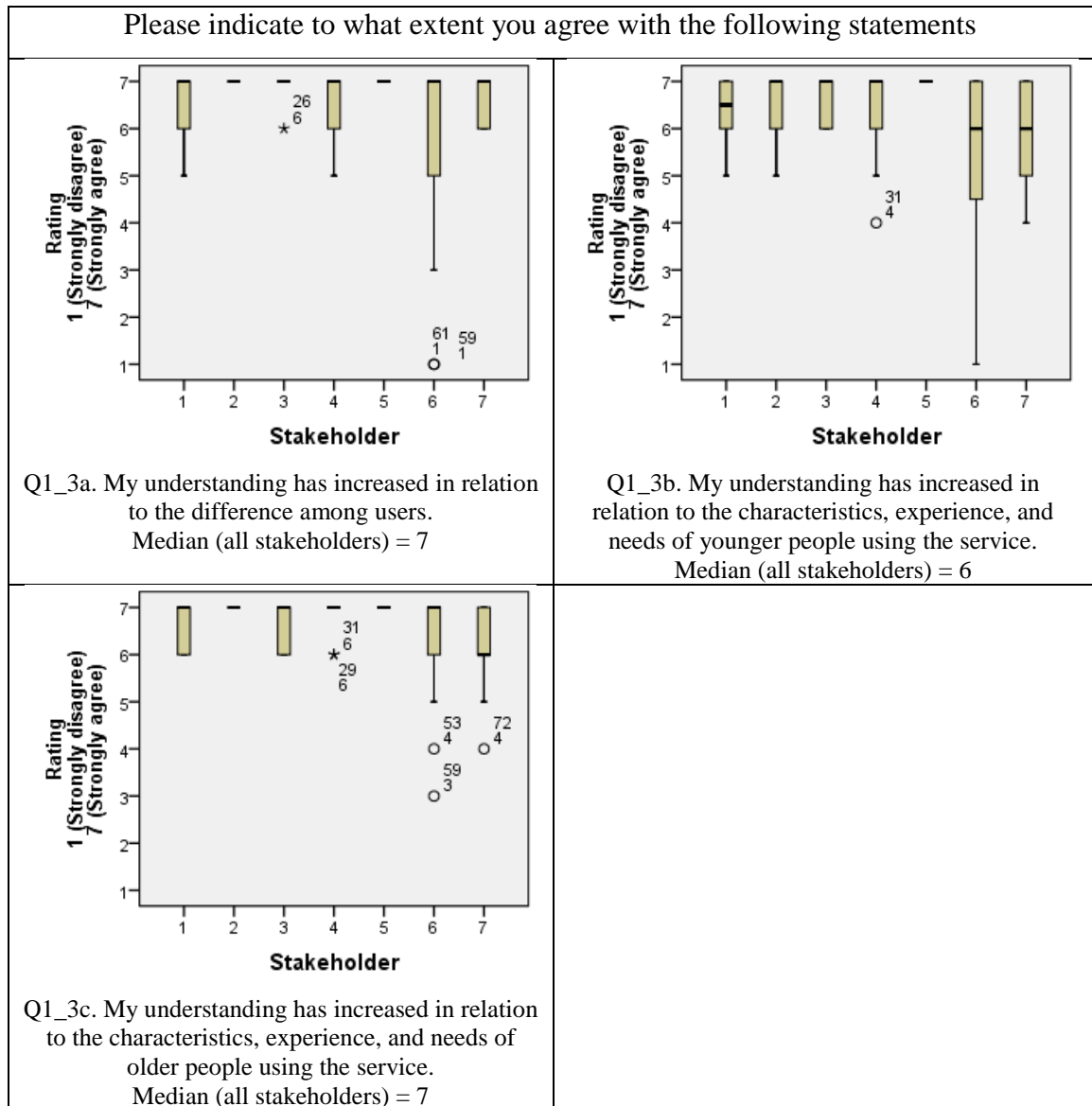
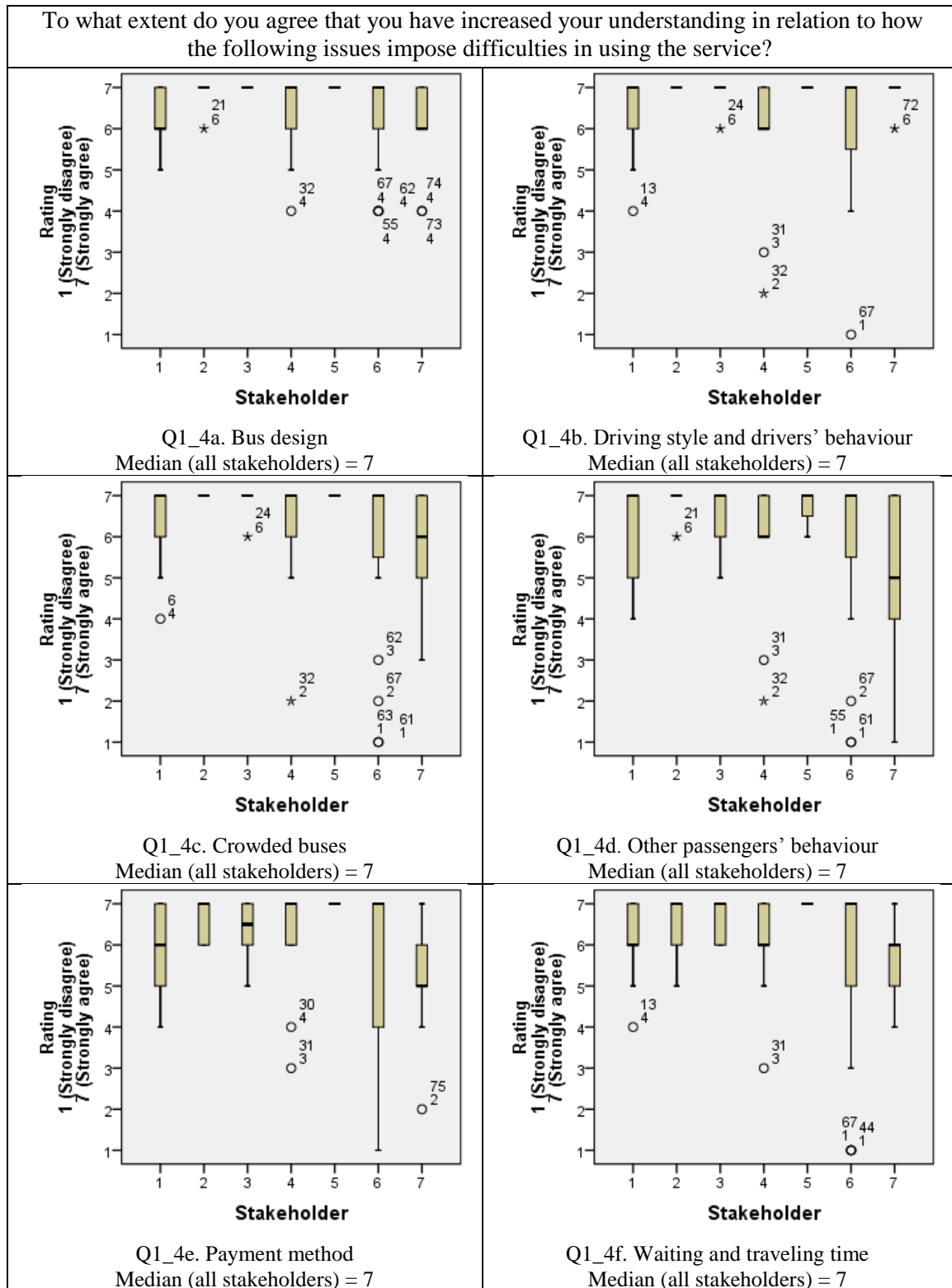


Figure 9.5 Boxplot for each question, differences between younger and older users
(1: Bus manufacturers, 2: Bus operators, 3: Local authorities in transport; 4: Local authorities in ageing, 5: NGOs, 6: Bus drivers, 7: Design students).

9.5.3.3 The critical issues for meeting the needs of users

Graphs present data in relation to the general question at the top of the Figure 9.6, based on response to the specific statements below each boxplot.



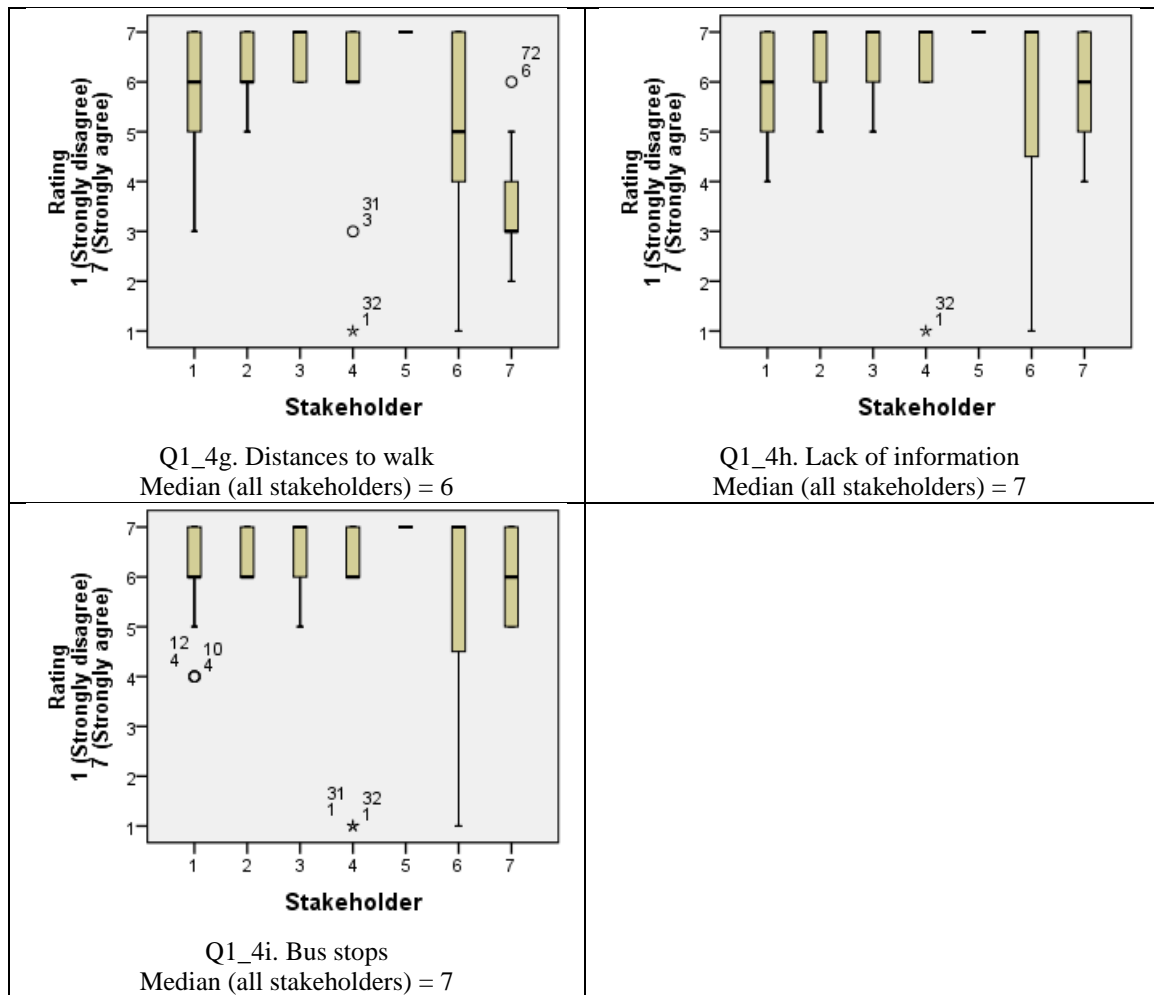


Figure 9.6 Boxplot for each question, critical issues in meeting users' needs
(1: Bus manufacturers, 2: Bus operators, 3: Local authorities in transport; 4: Local authorities in ageing, 5: NGOs, 6: Bus drivers, 7: Design students).

9.5.3.4 The different impact on younger and older users' experience

Graphs present data in relation to the general question at the top of the Figure 1.7, based on response to the specific statements below each boxplot.

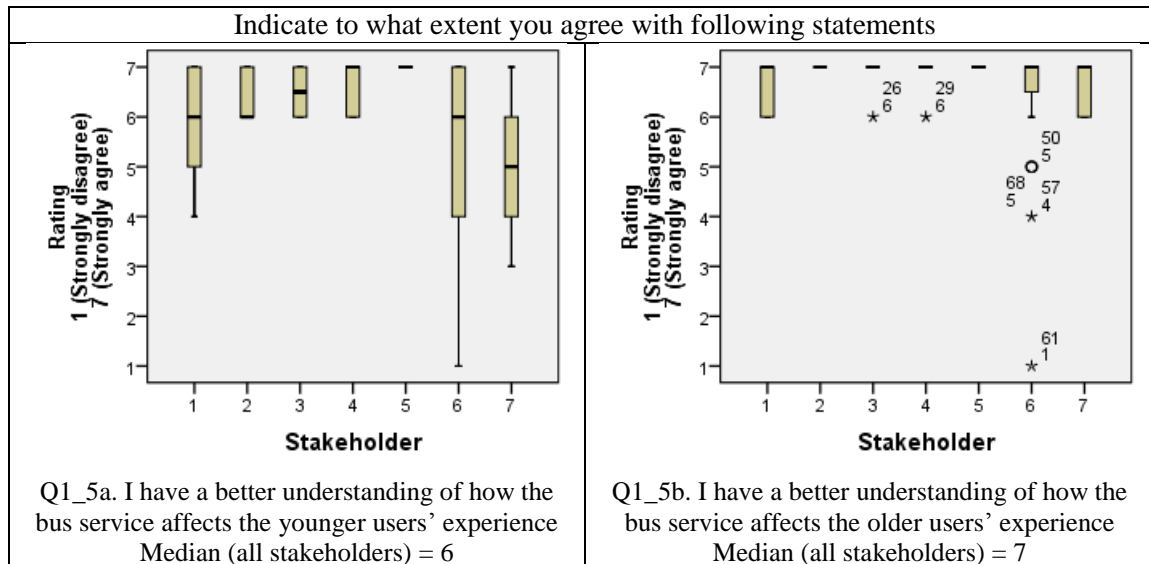


Figure 9.7 Boxplot for each question, different impact on younger and older users (1: Bus manufacturers, 2: Bus operators, 3: Local authorities in transport; 4: Local authorities in ageing, 5: NGOs, 6: Bus drivers, 7: Design students).

9.5.3.5 The relevance of considering all the elements of a door-to-door journey

Graphs present data in relation to the general question at the top of the Figure 9.8, based on response to the specific statements below each boxplot.

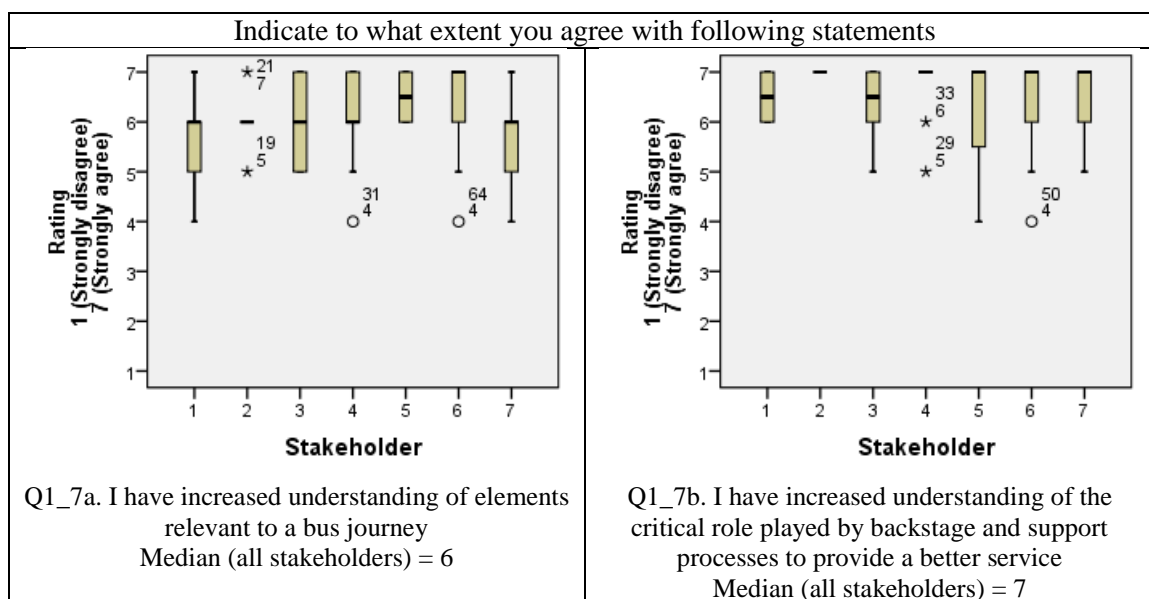


Figure 9.8 Boxplot for each question, relevance to consider a door-to-door journey (1: Bus manufacturers, 2: Bus operators, 3: Local authorities in transport; 4: Local authorities in ageing, 5: NGOs, 6: Bus drivers, 7: Design students).

9.5.4 Usefulness of the inclusive service blueprint

Graphs present data in relation to the general question at the top of the Figure 9.9, based on response to the specific statements below each boxplot.

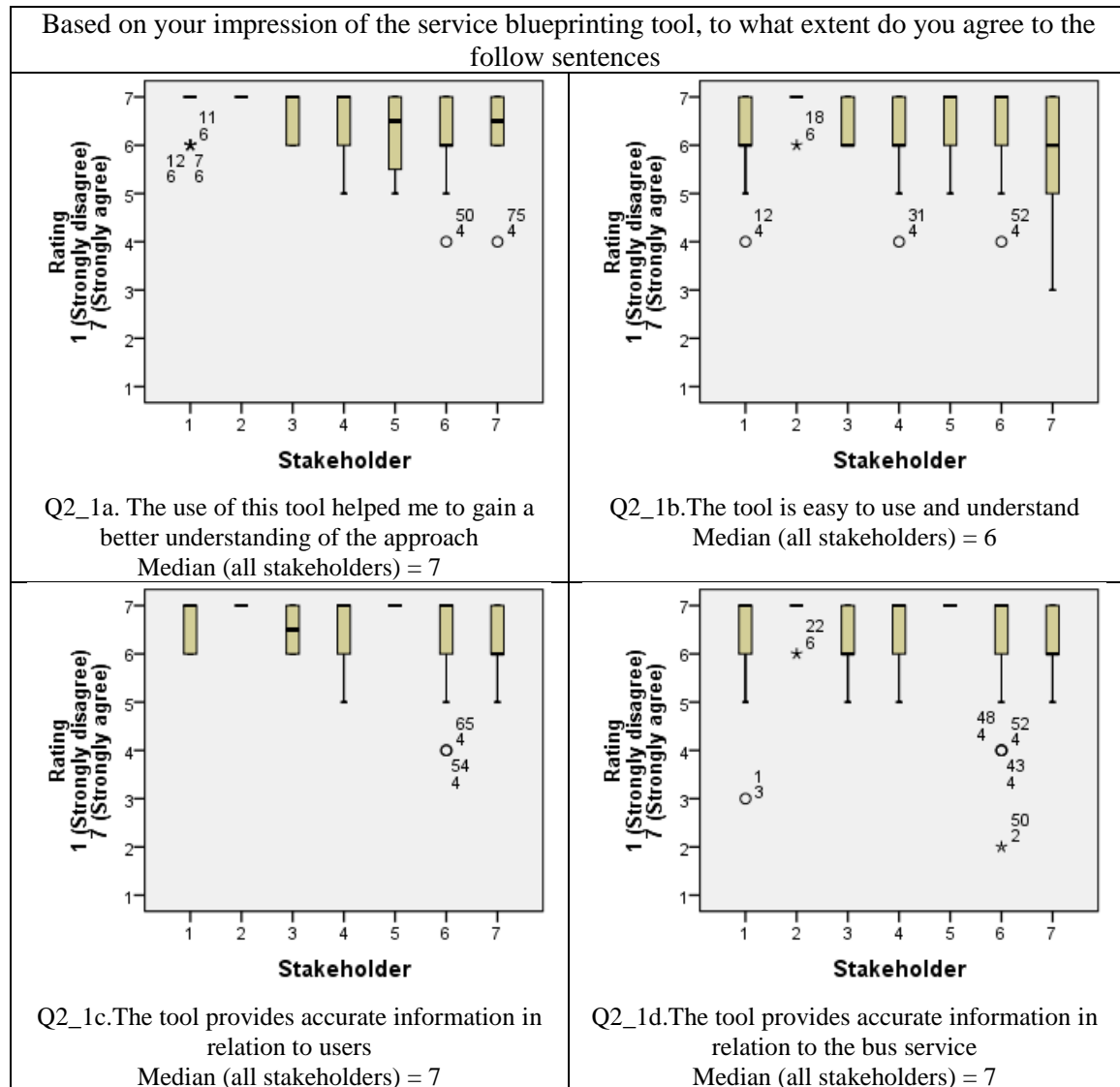


Figure 9.9 Boxplot for each question, usefulness of the inclusive service blueprint
(1: Bus manufacturers, 2: Bus operators, 3: Local authorities in transport; 4: Local authorities in ageing, 5: NGOs, 6: Bus drivers, 7: Design students).

9.5.4.1 Usefulness for communicating users' travelling experience and features of the current service provision

Graphs present data in relation to the general question at the top of the Figure 9.10, based on response to the specific statements below each boxplot.

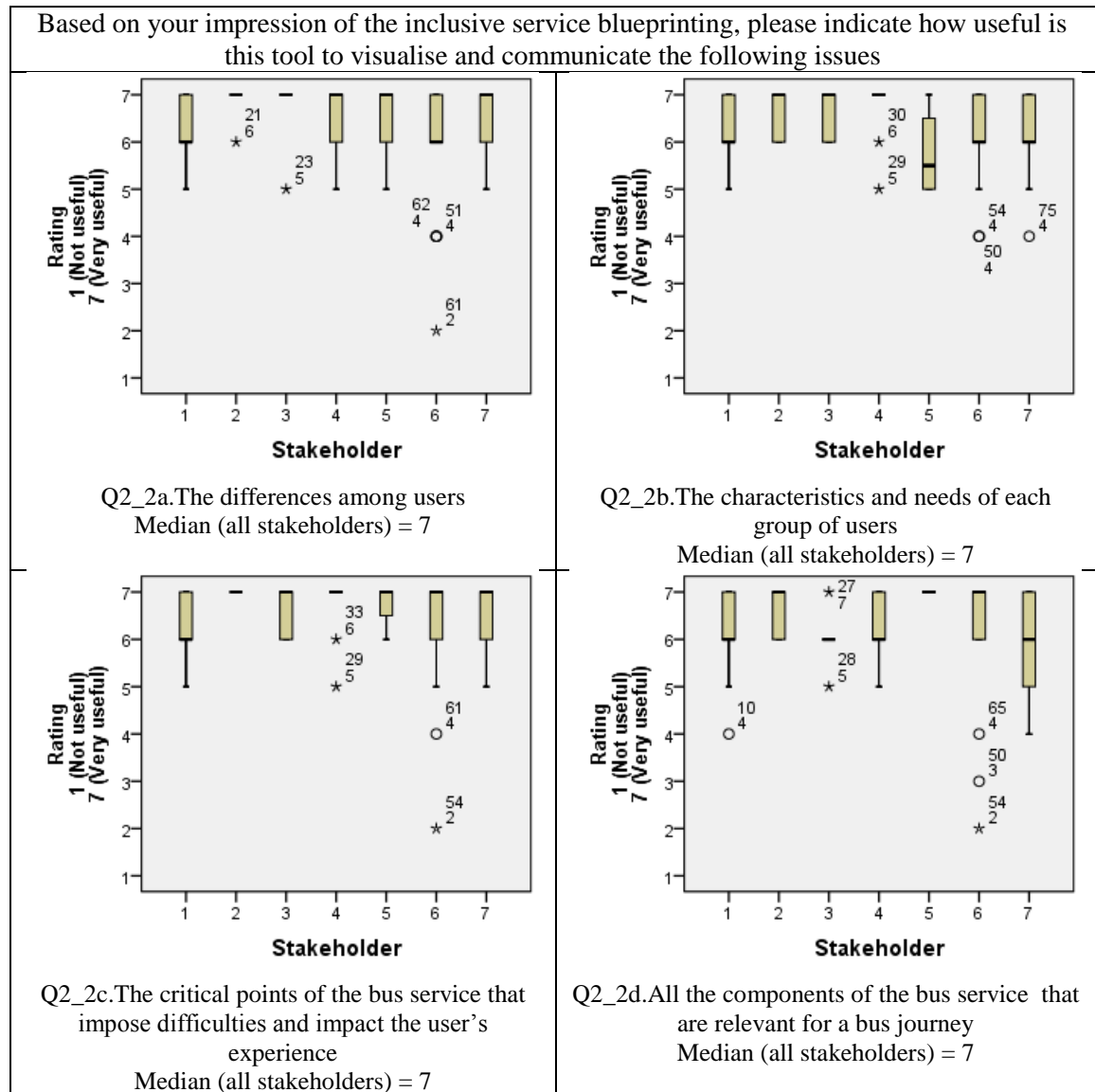


Figure 9.10 Boxplot for each question, usefulness to communicating
 (1: Bus manufacturers, 2: Bus operators, 3: Local authorities in transport; 4: Local authorities in ageing, 5: NGOs, 6: Bus drivers, 7: Design students).

9.5.5 Providing a common platform and generating ideas for improvement

Questions about the usefulness in generating ideas and providing a common platform for discussion were included for evaluating the approach and blueprint, respectively.

Graphs present data in relation to the specific statements in each box.

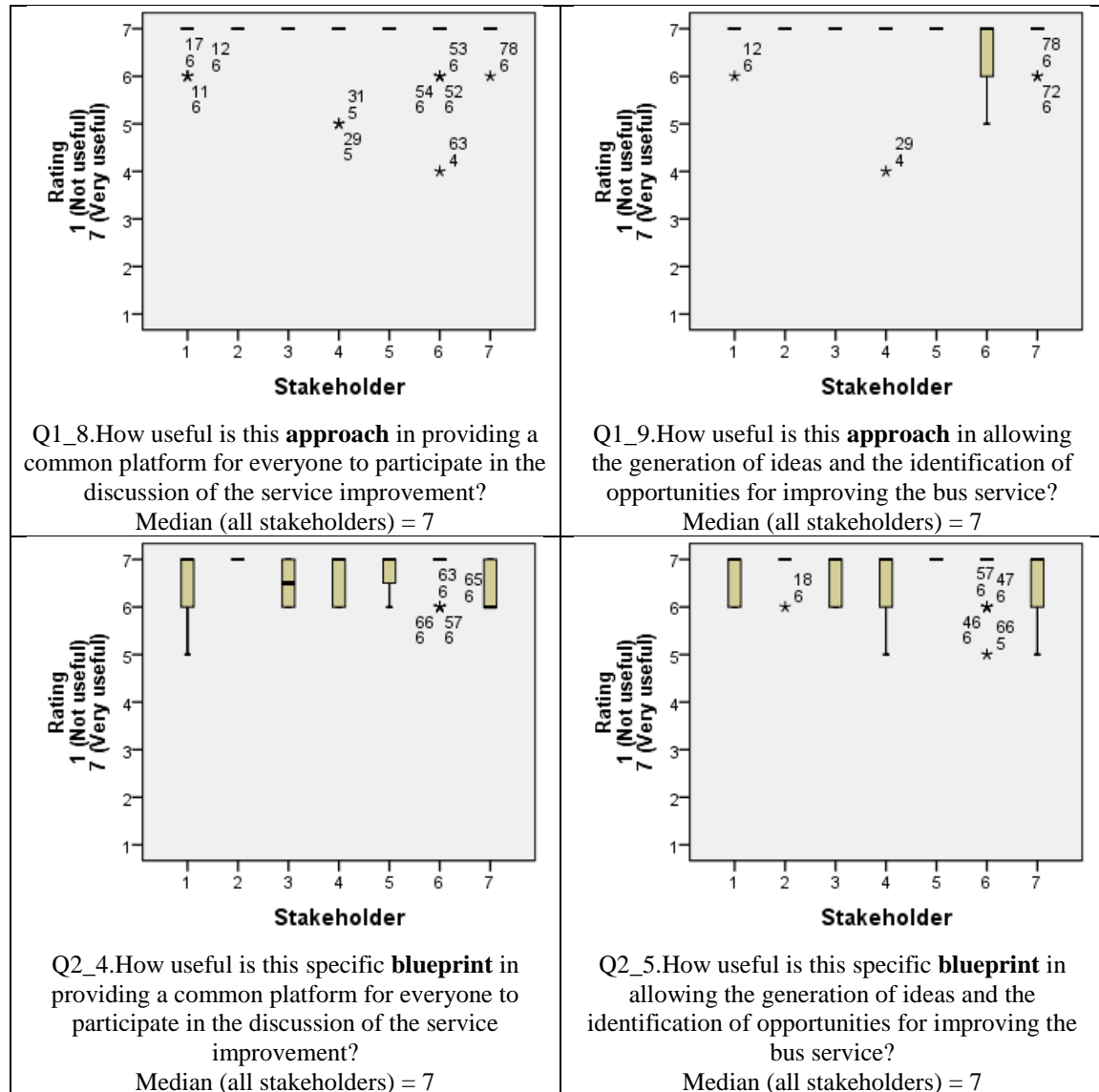


Figure 9.11 Boxplot for each question, providing a common platform and generating ideas for improvement (1: Bus manufacturers, 2: Bus operators, 3: Local authorities in transport; 4: Local authorities in ageing, 5: NGOs, 6: Bus drivers, 7: Design students).

9.5.5.1 Future use of the blueprint

Graphs present data in relation to the following statement ‘Based on your impression of the inclusive service blueprint, would you consider using it (as a tool) for a future service improvement?’

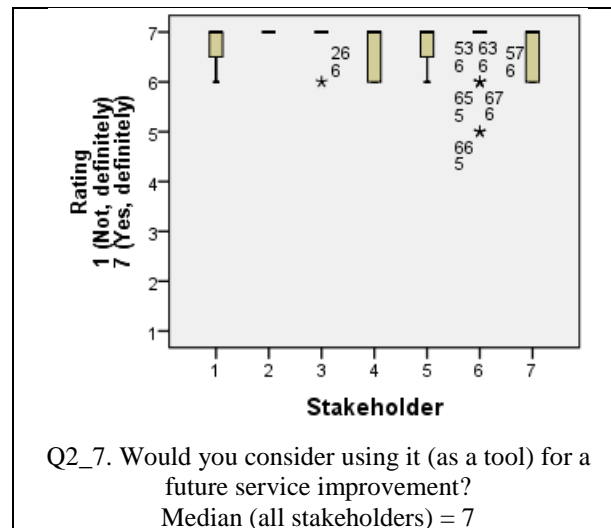


Figure 9.12 Boxplot for the question future use of the blueprint

(1: Bus manufacturers, 2: Bus operators, 3: Local authorities in transport; 4: Local authorities in ageing, 5: NGOs, 6: Bus drivers, 7: Design students).

9.5.6 New learning reported by stakeholders

An open ended question was included in the first questionnaire to allow participants to report any new ideas or learning from the workshop. Even though the question was structured as optional, 61 participants wrote down some new learning that they acquired from the workshop. Six broad themes and several ideas emerged from the analysis of this question.

Table 9.3 summarises these ideas and using ticks shows from which stakeholder group they emerged. However, beyond these ideas, a number of specific issues were identified from the answers given by drivers. These issues have a personal component from the experience and the role as drivers. For example, six of them wrote ‘as drivers we should change, we should have more empathy with older users’. Another nine stated ‘we should be more patient with them’.

Table 9.3 Summary of participants' new learning

New learning		Stakeholder group						
		1	2	3	4	5	6	7
Older people experience	What it really means using the service for an older person	✓	✓	✓	✓	✓	✓	✓
	Implications for actual and perceived safety for older users	✓			✓	✓	✓	✓
	How difficult boarding and alighting are for older people	✓	✓	✓	✓	✓	✓	✓
Older people abilities and needs	Older people require more effort and time to complete the task using the service	✓	✓	✓	✓	✓	✓	✓
	Postural control is more difficult for older people			✓	✓		✓	
	Older people have different abilities than younger people		✓	✓	✓		✓	
	Some disabilities are not easy to identify visually		✓					
Older people behaviour	Reasons for which older people prefer sitting in the front			✓	✓		✓	
	Advantages of older people using the front door for alighting			✓			✓	
Bus design	Bus design does not consider users, particularly older ones	✓					✓	✓
	Well-designed handrails are really important for the user experience	✓		✓	✓	✓	✓	✓
	Height and shape of steps really matter for the user experience	✓		✓		✓	✓	
Door-to-door journey	Relevance of considering the user experience in a door-to-door journey	✓			✓	✓		
	Identification of critical points along the door-to-door journey			✓	✓			
Inclusive service approach	Design should be inclusive and user centred	✓						
	Usability criterion should be considered when designing the service	✓			✓			
	Bus service might be better business if this approach is considered							✓
	'We are all ageing'	✓	✓				✓	
	Older people need and have the right of using the service			✓			✓	✓
	Bus service is related to independence and quality of life			✓	✓		✓	✓

1. Bus manufacturer; 2. Bus operators; 3. Local Authorities in transport; 4. Local Authorities in ageing; 5. NGOs; 6. Drivers; 7. Design students

9.5.7 Verbal feedback

In the final stage of each workshop, stakeholders expressed opinions about the approach and blueprint tool. The thematic analysis of those comments allowed identification of a series of themes and subthemes related to the approach and blueprint. These themes can be divided in 1) barriers and enablers for using or applying the approach; 2) increasing awareness about older people experience; 3) getting ideas for service improvement; 4) interest in continuing with the application of the approach for the service improvement; and, 5) feedback on the blueprint.

9.5.7.1 Barriers and enablers for using the approach

Table 9.4 and Table 9.5 present the themes, subthemes and some of the most representative quotes from stakeholders relating to the barriers and enablers in using the approach.

Table 9.4 Summary of barriers for using the approach

Stakeholder	Barriers	Quotes
Bus operators	Lack of legislation and support from the government	<i>‘The truth is that we are used to that authority imposes us what to do. If the law is imposed, the operator acts, because it is difficult to convince ourselves’.</i> <i>‘However, the authority does not do its job and does not offer any facility’.</i>
	Economic restrictions	<i>‘The low entry bus is impossible, we would like to buy it, but the economy implies that we cannot afford one’</i>
Local authority	Economic restrictions	<i>‘Automatic transmission is pretty good, but in terms of energy costs and fuel is very expensive’.</i>
	Unwillingness to change	<i>‘The approach is very good, but what is the disposition of the operators to generate the changes?’</i>
Driver	Informality of the bus system	<i>‘We could do a good job; in fact we try to do it. But it could be better if bus operators would be well-organized as bus companies, and we were paid without consider how many passengers we collect’.</i>
Design student	Unwillingness to change	<i>‘We must influence the authorities; it seems that they are not interested in making changes’</i>

Table 9.5 Summary of enablers for using the approach

Stakeholder	Enablers	Quotes
Bus operators	Willingness to change	<i>‘We want to improve the bus service and I find very interesting the use of this approach’.</i>
	Need to try different solutions	<i>‘We have made some changes, but we like to hear and try other alternatives’</i>
	Need to increase the number of users	<i>‘We see how our business has been losing passengers for many reasons. We want to innovate in order to regain our users’</i>
Local authority	System is under pressure and the legislation is changing	<i>‘Part of the change in the law of mobility and new regulations mark the transition to the enterprise path. Even not for the service’s quality, it is economic, since it is no longer possible to keep the number of buses, fuel and drivers being used. Model must change!’</i>
Bus manufacturer	Willingness to change	<i>‘I think that operators have the desire to make changes’</i>
NGOs	Need to increase the number of users	<i>‘The message of profitability for service providers is clearly reflected in the increase in the number of users that would bring with it the application of this approach’</i>
	Interest in the approach	<i>‘The approach is very interesting because it might be applied to any service or even customised with different users’</i>

9.5.7.2 Increasing awareness about older user experience

Some participants stated how their awareness of the experiences of older users using the service had increased after the workshop. For example, a participant from the local authorities expressed:

'Something I had not considered and I really caught my attention is the fact that for older people it is harder to get off than get on the bus. I always had the idea that climbing up was more difficult'

In turn, a design student commented about older people difficulties and the behaviour of other users towards them:

'The issue is even more serious because the elders bring their bags and have to take out the wallet to pay; at the same time the bus is moving. In addition, there is a lack of respect for older people by the young'

9.5.7.3 Generating ideas for service improvement

In most of the workshops there were participants who expressed that the presentation of the approach and blueprint had inspired them to generate some ideas for service improvement. The following quotes comprise some of their comments:

'I think the problem may finish when service operators become an enterprise. It may finish when we as drivers have a fixed salary. We understand what we need to do to improve the service, but service providers must become entrepreneurs' (Driver).

'For me it is clear the importance of considering the service as a service' (Driver).

'I think that from this talk we may ask the bus manufacturing company that improves the bodywork of the buses' (Bus operator).

'Some of what I learned and I really liked is the idea of 'designing better drivers'. I think we can improve our selection and training processes' (Bus operator).

'When you start the conversation, it was very interesting because I started to imagine how it could be the design of an inclusive bus. I started thinking about some solutions. And I started to have many images as well as, how to design a transportation system? I would not have thought to do a

transportation system for all. The approach leads me to think about the inclusion of people in other services as well, not just in transport' (Local authority).

9.5.7.4 Interest in the application of the approach and blueprint tool for service improvement

Beyond their participation in the workshops, some stakeholders stated being interested in the following using the approach for service improvement. These were some of their comments:

'We are keen to keep in touch with you, and continue discussing the possibilities for service improvement' (Bus operator)

'I think it can be applied to the model route. These ideas could easily apply to the model service' (Bus operator)

'I understand that this approach can be applied in the medium and long term. I wonder whether the approach has methodology to develop the final stages of service design. That would be very interesting' (NGOs)

'At this point maybe we cannot make a low entry bus, but what we will do is to put a handrail where it should be. We will review the heights and shapes of the steps so that they are where they should be. While there are economic constraints, we will focus on applying simple solutions' (Bus manufacturer).

Besides these comments, at the request of stakeholders some extra activities were planned and undertaken after the workshops to promote the idea of using the inclusive service design approach for service improvement. For instance, an official of the local authorities invited the researcher to present the approach in a press conference. To this event were also invited the Minister of Mobility, a member of the local parliament and a number of the most influential businessmen in transport. The Minister said that at the moment was not possible to buy and implement low entry buses, but other solutions will be considered for service improvement. In turn, the member of the parliament expressed the intention to consider the outcomes of this research for improving and making some changes to the respective official standards in order to provide a safer service for older people.

The session with the media produced news on the TV, radio and also in the local press. Figure 9.13 and Figure 9.14 show images from two local newspapers (for a full list of

newspapers and links to the radio news features see Appendix O). The newspapers reports are all about improving the service to be used by older people. It is stated that after the press conference the Government acquired a better understanding about ways to make the service more inclusive.

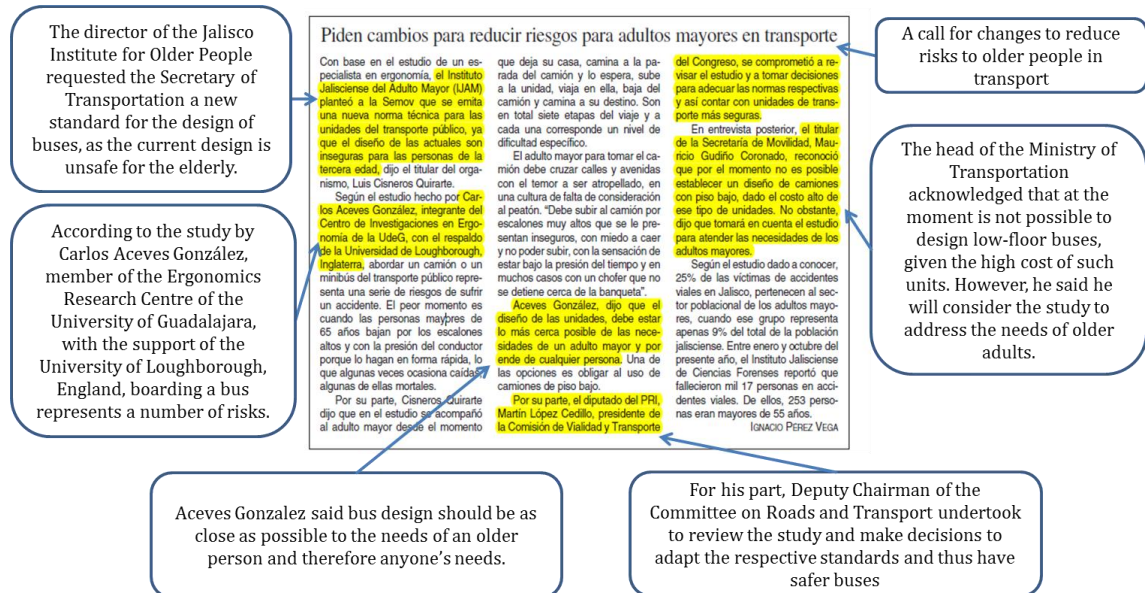


Figure 9.13 News from the press conference (Source: La Jornada Jalisco)



Figure 9.14 News from the press conference (Source: Diario Mural)

Additionally, a NGO invited the researcher to hold an interview on radio to discuss and promote the idea relating to the need for designing a more inclusive transport system in the city. In turn, the design department of the bus manufacturing company has been in contact with the researcher to discuss some ideas for bus design. Furthermore, recently the researcher has been invited to evaluate and give some recommendations on the local standard that regulates bus design. Likewise, some stakeholder groups requested the blueprint tool for future use. For instance, the Local Authority requested permission to upload a digital version of this blueprint in their website in order to the staff members to have easier access to the document (available on <http://ijam.org.mx/files/blueprint.pdf>).

Recently, the local authority, in collaboration with the main syndicate of bus operators, is developing programmes based on the results of this research and using the inclusive service blueprint as a tool. The first programme, already implemented, consists of training bus drivers to offer a better service specifically for older and disabled users. This programme was followed by an advertising campaign, using the buses themselves

as media for delivering the message (see Figure 9.15). The intention is to raise awareness among bus users about what implies being old and using the bus service, and that the local authority is working to improve the service for this target group. Appendix P shows some extra evidence of these activities and photos of the campaign.

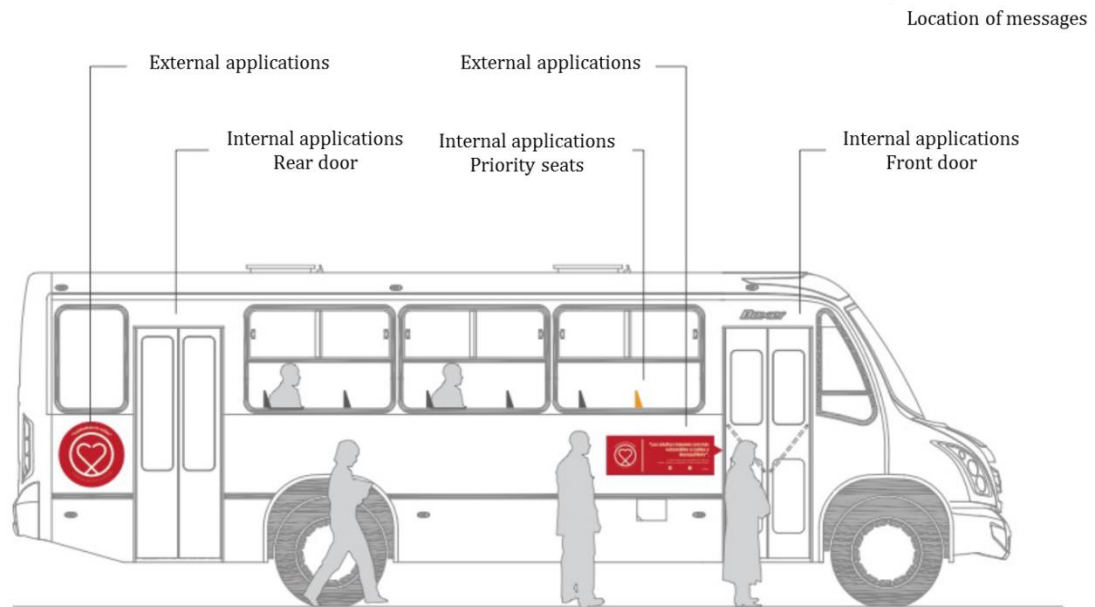


Figure 9.15 Location of the friendly-age messages on buses (IJAM, 2014)

9.5.7.5 Feedback on the blueprint

Participants from most of the workshops provided positive feedback on the inclusive service blueprint. Table 9.6 provides some of their comments about the blueprint. It shows that the participants largely found the blueprint an effective tool for visualising the current service and providing a platform for generating ideas for service improvement. However, it should be stressed that there were only two overtly critical comments on the blueprint. A design student expressed that the blueprint comprised too much information and that might be difficult for some people to be understood. Another participant in the NGOs workshop made a comment related to the colours in the blueprint. He said that the colours were similar to those which are used for a political party and therefore it might be misunderstood by some stakeholders.

Table 9.6 Feedback about the inclusive service blueprint

Stakeholder	Quotes
Bus operators	<i>'I can see through the blueprint a series of opportunities for change ... it is very interesting because each frame leads to the problem but also gives ideas for a solution'</i>
Local authorities	<i>'I think it is very good, because you can understand what a journey is. It can be used in any other mode of transport. You can get others to understand what you're talking about regardless of the mode of transport. That's one of the big problems we have had, that is, people often fail to understand what a journey is'</i> <i>'It seems to me a very effective tool; it is much more understandable if one tries to explain to users, service providers or anyone. It is easier to reach them with graphics, with something as simple to explain, rather than a very large document or statistics. It is best where there is a graphic explanation'</i> <i>'The blueprint is very comprehensive, integrates all the elements of the service, very enlightening'</i> <i>'I think it's good, very good. It can be used for discussion and improvement of the service'</i>
NGOs	<i>'The blueprint reflects the areas that can be modified without the need for large investments'</i>
Design students	<i>'During my Master studies I have seen different ergonomics tools, but I think this (blueprint) brings advantages because it gives clarity to the analysis and allows faster progress. It meets the ease of looking at things on an individual basis, but also in a global way. As a tool it seems to me very interesting'</i> <i>'Visualization of the interaction points is great'</i>

9.6 Discussion

Considering the perspective of the main stakeholders, this study aimed to evaluate the usefulness of (1) the inclusive service approach for enhancing the bus service; and (2) additionally the blueprint tool for communicating user data and issues to do with the current service provision. Results from this study suggest a series of benefits of using the inclusive service approach for enhancing the bus service, drawn from the potential of the approach to engage the stakeholders' interest. Stakeholders' engagement is important for service improvement (Polaine et al., 2013) (discussed in section 9.6.1). Also, there is potential to improve the stakeholders' understanding of the differences in capabilities and needs of younger and older users (discussed in section 9.6.2) and the key elements that should be considered in enhancing the service provision (discussed in section 9.6.3). Likewise, the usefulness and uniqueness of the blueprinting tool for visualising and communicating differences in capabilities and needs between younger and older users has been shown (discussed in section 9.6.4). The use of the approach

also helped in increasing understanding of the value of designing a more inclusive bus service (discussed in Section 9.6.5).

9.6.1 Potential to engage the stakeholders' interest

Overall, the stakeholder groups provided a positive assessment of the usefulness of the approach for improving the service (as indicated in Figure 9.3). It can be seen that all stakeholders groups provided similar ratings to most of the questions; by inspection, only the question Q1_1d, which relates to whether the approach provides benefits for service providers, seems to demonstrate differences in relation to the stakeholder groups. A Kruskal-Wallis Test revealed a statistically significant difference in the level of agreement across the seven stakeholder groups, $\chi^2(6, n = 80) = 13.73, p = .033$. Bus manufacturers as well as local transport authorities and design students recorded lower median scores (Median = 6.5 and 6 respectively) than the other four groups, which recorded median values of seven. This difference might be explained by the fact that stakeholders know that improving the service implies an investment that should be undertaken mostly by service operators, but it is well-known that they are not very keen to do it. However, one surprising result was the fact that most of the bus operators strongly agreed that using the approach can provide benefits for them.

These results from the questionnaire show that the approach attracted the stakeholders' interest. Such interest was also expressed through verbal feedback (Section 9.5.7.4), as well as through the interest shown after the workshops drawn from the engagement with the Minister of Transport, the member of the Local Parliament, and a number of the most influential businessmen in the transport field through the press conference. There are two possible explanations for this interest in the approach from the stakeholders. There is an urgent need and a huge social and political pressure for service improvement (as discussed in chapter 4). However, perhaps the best explanation comes from the fact that it is relatively easy to make the case for the inclusive service design approach. The social case for inclusive design is relatively self-explanatory (Coleman, 2006) in a context of the ageing population. This situation can easily engage with stakeholder groups as the local authorities or the NGOs. Similarly, the business case, that suggests that inclusive products 'can reach a wider market, improve customer satisfaction and drive business success' (Waller et al, 2013:1), can engage with bus operators, bus manufacturers and the local authorities.

Stakeholders provided positive feedback on the usefulness of the approach and many of them showed interest in taking some ideas from the workshop and transform these ideas into actions for service improvement. However, some participants also expressed that there was a series of barriers that might prevent its implementation, and they were sceptical about the real possibility of applying the approach. The feedback shown in Table 9.4 suggested the presence of conflict of interests and the lack of trust between stakeholders. For instance, bus operators were highlighted as a group not interested in improving the service. In contrast, willingness to change from service operators was indicated as part of the enablers for using the approach.

Despite actual and perceived limitations for using the inclusive service design approach in that particular context, there were a series of signals that suggest stakeholder groups were attracted to, and interested in, using the approach for service improvement. This situation reveals an area of opportunity for the expansion of these design approaches in countries with similar characteristics, which is consistent with Cassim et al., (2007) who state that new developments of inclusive design will be in those less advantaged and resourced communities in the developing world.

9.6.2 Improving understanding of users' differences

As stated in the literature review, the design of a product or service is typically built on a clear understanding of the needs and capabilities of the widest possible range of users, irrespective of age or disability (Clarkson et al., 2007). Moreover, given the co-creative nature of a service, all stakeholders should be involved in the design process (Stickdorn & Schneider, 2010), and it is relevant that they all obtain a clear understanding of users' needs.

Results shown in Figure 9.5 indicate that stakeholder groups improved their understanding of the fact that younger and older users are different, and therefore they have different needs and different experience using the bus. These results are reinforced with those in Figure 9.7. In both figures it can be observed that participants provided higher ratings to the statements related to the understanding of older people needs and experience rather than younger ones. These results can be explained by the fact that participants might be already aware of the needs of younger people because they are themselves generally younger, therefore they found the workshops particularly helpful in understanding the position of older people.

The analysis of the written responses from the questionnaire (Table 9.3) strengthens these results and provides a clear idea of how participants from different groups increased their understanding related to older people's abilities, needs, behaviour, and experience using the bus service. For instance, it highlights that two 'obvious' situations related to older passengers experience were highlighted as 'new learning' for participants in all stakeholder groups. The new knowledge was about 'how difficult boarding and alighting are for older people' and 'older people require more effort and time to complete the tasks of boarding and alighting when using the service'. Similarly, analysis of the verbal feedback indicated that some stakeholder were willing to talk more about the older user experience due to their increased awareness of it.

Therefore the workshops accomplished the objective of improving understanding amongst stakeholders of: (1) the differences in capabilities and needs between younger and older users; (2) how problematic issues impact differentially on younger and older passengers' experiences. Such findings are consistent with how the knowledge stemming from Inclusive Design and Service Design is frequently used by designers and researchers to communicate research results and to raise awareness of the different abilities and needs of users (Dong et al., 2013; Segelström, 2009).

9.6.3 Improving understanding of the key elements that should be considered in enhancing the service provision

From a Service Design perspective, services need to be understood as a series of critical encounters that take place over time in a specific environment (Parker & Heapy, 2006; Stickdorn & Schneider, 2010). Therefore this study also aimed to improve understanding of the key elements that impose difficulties in using the service. Results in Figure 9.6 suggest that stakeholders improved their understanding related to the issues of the bus service that are critical in meeting the needs of users. Again the analysis of the written responses from the questionnaire (Table 9.3) reinforces these results and offers particular insights that stakeholders reported as 'new learning' from the workshops. These insights were related specifically to the bus design and driver behaviour and its impact on the older users' experience.

Similarly, results in Figure 9.8 indicate that there was an improvement in understanding the relevance of considering each individual aspect of a service in a door-to-door journey, and the key role played by people behind the frontline staff (drivers) in

providing a better service. There were written responses from some stakeholders regarding to these particular subjects (Section 9.5.6).

9.6.4 Usefulness and uniqueness of the inclusive service blueprint

The main contribution of this blueprint is its sense of inclusiveness. First, as stated in the literature review, a typical service blueprint describes customer actions and shows the interactions points, but it does not consider differences in the abilities, needs, or desires that each user or group of users possess. The graphic representation of the level of difficulty for younger and older people helped demonstrate visually the experience of two different groups of users. Results from this study (Figure 9.10) indicate that stakeholders considered that this blueprint is very useful to visualise and communicate this difference in capabilities and needs between these two groups of users. Although this blueprint only shows the experience of these group of users, it must be said that an inclusive service blueprint could comprise other groups of users, namely disabled people, pregnant women, parents with pushchairs or travellers with a piece of luggage. Second, visualising the level of difficulty allowed a recognising of the different implications in using the service, for younger and older users. This sense of inclusiveness represents a contribution to service blueprinting, and therefore to service design.

Moreover, as stated in the literature review, service blueprints facilitate problem solving and creative thinking by identifying potential points of failure and highlighting opportunities to enhance customers' perceptions of the service (Chuang, 2007; Polaine et al., 2013). However, the representation of the level of difficulty within the design of this inclusive blueprint allowed stakeholders to identify points of failure along the service stages for young and older people as indicated by results in Figure 9.10. This graphic representation also permitted stakeholders to detect the points of interaction associated with higher level of difficulty, and therefore it provides a set of priorities for service improvement and contributes to determining what actions should be taken in order to improve the service. Overall, the analysis of stakeholders' responses described in Section 9.5.6 indicates a clear recognition of critical points in using the service, particularly for older users. Additional evidence of the recognition of critical points comes from the analysis of the news reports after the press conference, which focussed on the most critical points of interaction (e.g. boarding and alighting) and suggested the implementation of pertinent changes such as redesigning the bus.

The blueprint also provided a means for contrasting the ideal service (as defined in Section 8.4.2 8.4.2) and the younger and older user experience with the existing service. This visualisation enabled demonstrating how the gap between personal abilities and environmental demands become wider for older people. Notwithstanding, the most prominent result to emerge from this inclusive service blueprint is that in addressing older people's needs in improving the service, the needs of younger people would be considered as well. This is a clear principle emerging from the Inclusive Design philosophy that contributes to designing inclusive services. More specifically, the development and assessment of the inclusive blueprint also contributes to the area of Inclusive Design that works on understanding the information needs of the groups interested in inclusive design solutions (Dong et al., 2013).

Service blueprinting provides a common platform and a point of discussion for all stakeholders in order to participate in service improvement (Bitner et al., 2008), and for the generation of ideas and the identification of opportunities for improving the bus service (Chuang, 2007; Polaine et al., 2013). Results in Figure 9.11 suggest that it was also the case for the inclusive blueprint used in this study. Nevertheless, the use of this blueprint enabled a focus on the generation of ideas for a more inclusive bus service. For instance, in the press conference the representative of the Local Parliament expressed his intention to review the legislation in order to contribute to a safer bus service for older people; or the official from local authority who expressed the following idea:

'It was very interesting because I started to imagine how it could be the design of an inclusive bus. I started thinking about some solutions. And I started to have many images as well as, how to design a transportation system? I would not have thought to do a transportation system for all. The approach leads me to think about the inclusion of people in other services as well, not just in transport'

Finally, it was evident in the workshops that the blueprint helped in attracting the participants' interest towards the approach. Also, the ratings from the statement Q2_1a suggest that the use of this tool helped stakeholders to gain a better understanding of the meaning of this approach. But even more, it was the attractiveness of the blueprint what prompted a person from the local authority to suggest its presentation to the Ministry of Transport in a press conference.

9.6.5 Understanding the value of designing a more inclusive bus service

One specific question relates to the idea of the value of designing for inclusion. In Sections 9.5.6 and 9.5.7 it can be observed that stakeholders improved their understanding in terms of the relevance of thinking and designing for inclusion. The following sentences illustrate this idea: ‘Design should be inclusive’ (Bus manufacturer) ‘Older people need and have the right of using the service’ (Local authority, drivers and design students) ‘Bus service might be better business if this approach is considered’ (design student). Some participants (bus manufacturer, bus operator and drivers) also expressed their increased understanding of how the ‘bus service is related to independence and quality of life’ and the relevance of having an inclusive service because as they said: ‘we are all ageing’. This is in line with Manzini (2011), who suggests that the tools used in service design ‘do not serve only to make ideas co-created by the group more visible and assessable (visualising) but also stimulate the group by feeding the discussion with original visions and proposals (visioning)’.

9.7 Critique of the study

The aims of this study were to investigate the use of the inclusive service design approach for enhancing the bus service from the main stakeholders’ perspective; and the usefulness of the inclusive service blueprint for communicating user differences and the features of current service provision. Overall the workshops as a way of facilitating interaction, and the use of the questionnaires and verbal response as data collection, were effective methods for assessing the use of approach and blueprint tool. Participants had opportunity to provide specific ratings and also express wider points of view about the tool and approach.

A potential limitation of this study is that the evaluation of the approach was based on the presentation in the workshops, rather than on judgements coming after using the approach for service improvement. It would have been interesting, for instance, to see the use of the approach and blueprint tool in an actual discussion among stakeholder groups relating to service improvement; this would have enabled a better assessment and further development of this tool, and the study would have reached the next stage – i.e. the redesigning of the service. Nevertheless, such circumstances are conditioned by the nature of the service and beyond of the scope of this study.

The study was also successful in attracting a substantial number of participants from a variety of stakeholder groups, but a limitation (based mostly on logistical difficulties) was that in each workshop there were participants from only one group of stakeholders. There was therefore interaction within a group of stakeholders, but not interaction between stakeholder groups. Perhaps, a series of workshops with mixed participants would have provided a richer discussion and feedback.

Another limitation is the fact that ideally the blueprint should have been assessed by academic experts. Given that one of the aims of this research was to contribute to bus service improvement, it was decided to assess the blueprint with stakeholders. However, it is recognised that an assessment with academic experts is needed as part of future research. Finally, it was also a limitation that this study did not identify the ages of participants. Age may have been relevant because stakeholders may have more awareness of designing for their own needs and they may not consider the needs of older people.

9.8 Conclusions

This chapter presented the last study implemented during this PhD research. In summary, this chapter has detailed the process followed to assess the usefulness of the inclusive service design approach for enhancing the bus service. The results presented here made it possible to conclude that the inclusive service approach and the blueprint tool have the potential for supporting the bus service improvement.

After the analysis of the data from this study, the main conclusions from this study are:

- The inclusive service design approach and the blueprint tool were useful to engage the stakeholders' interest and to make them consider using the approach as a basis for service improvement.
- The inclusive approach allowed stakeholders to improve their understanding relating to the fact that younger and older users are different, and therefore have different capabilities and needs and different experiences using the bus.
- The inclusive approach enabled stakeholders to obtain a better understanding relating to: 1) issues of the bus service that are critical in meeting the needs of younger and older users; 2) the relevance of considering each individual aspect of a service in a door-to-door journey; and 3) the key role played by people behind the frontline staff (drivers) in providing a better service.

- The inclusive service blueprint is a very effective tool for visualising and communicating the difference in capabilities and needs between younger and older users. Furthermore, using this inclusive tool enabled stakeholders to focus on the generation of ideas for a more inclusive bus service.
- The brief provided in the workshops, which comprised information on the approach and results of the previous studies, as well as the presentation of the blueprint tool, helped the stakeholders to understand the value of designing for a more inclusive bus service.

The inclusive service design approach seems to be useful for enhancing bus service because its potential to: 1) engage the stakeholders' interest, 2) improve understanding amongst stakeholders, and 3) communicate the capabilities and needs of different groups of users.

Chapter 10 Discussion

10.1 Overview

In this research, an inclusive service design approach was developed, formed by the integration of theory and methods from the domains of Service Design and Inclusive Design, in order to design for inclusive services. To explore its use and potential benefits, the approach was applied to investigate and enhance the bus service use by younger and older people in Guadalajara, Mexico. To achieve the development and application of this approach, the research has comprised 1) a review of the literature; 2) the use of a multi methods approach to understand the context of the bus service and the users' experience; 3) the use and development of a tool for designing inclusive services; and 4) a final study to assess the usefulness of the approach in improving the bus service. The results of each individual study on passengers and service stakeholders are discussed in the individual chapters (Chapter 4 to Chapter 9). This discussion chapter focuses on the broader issues of interest within the thesis. This thesis provides four main theoretical and practical areas for discussion, which are:

- The potential benefits of using an inclusive service design approach for designing better services (Section 10.2),
- Differences between younger and older passengers and the implications for designing public transport services (Section 10.3),
- The potential impact of the *inclusive* service blueprint in designing better services (Section 10.4),
- The lessons learnt from the applied methodology, its challenges and limitations (Section 10.5).

10.2 Benefits of an inclusive service approach in designing for better services

A simple idea from Inclusive Design was used throughout this research project:

‘Inclusive design is better design’ (Clarkson et al., 2007).

This idea therefore places an emphasis on the application of the inclusive philosophy through the design process. Based on this idea, this research started with a preconception that *‘inclusive services are better services’*. Consequently, at the outset of this research the integration of theory and approaches from the domains of Service Design and Inclusive Design was the route proposed to guide the design of inclusive services. It has been highlighted the potential that these two approaches have to individually transform services into more functional, usable, desirable and viable ones (Clarkson et al., 2007; Mager & Sung, 2011), but explicitly considering their integration as a facilitator of designing better services is a novel way to see that potential. This is the main contribution from this research.

In the literature review were identified the principles, methods and techniques that these approaches contribute in designing for inclusive services. Service domain provides the principles of 'human-centred', 'co-creative', 'sequencing', 'evidencing' and 'holistic' (as discussed in Section 2.3.2) (Meroni & Sangiorgi, 2011; Stickdorn & Schneider, 2010). Inclusive Design offers its principle of inclusion which focusses on ‘design of mainstream products and/or services that are accessible to, and usable by, people with the widest range of abilities within the widest range of situations without the need for special adaptation or design’ (BS 7000-6, 2005). In addition, visualisation techniques (Service Design), and the capability-demand theory (Inclusive Design) were identified as fundamental components to an inclusive service design approach.

Within this research a number of benefits have been identified in explicitly combining inclusive design and service design in investigating the bus service. For instance, benefits during the first stage (the ‘Develop’ as outlined in Section 1.6) were:

1. The ‘big picture’ obtained from the use of a holistic approach

The service approach led the data collection to focus on the broader service, i.e. 1) the actors involved in the service provision (users, bus drivers, service operators, local authorities, etc.); 2) most of the service components (information, bus design, routes,

drivers, other users, etc.); 3) all the user interactions along the stages in a door to door journey (before the journey, walking to the bus stop, waiting for the bus, etc.). As a result, a large volume of data was obtained from the study which allows understanding users and other stakeholders' needs – (e.g. bus drivers). Equally, the use of this approach permitted the identification and understanding of factors that cause the failure of the service elements, e.g. establishing the reasons behind drivers' behaviour, and what the implications are for service improvement.

This is perhaps, one of the main differences between the use of an inclusive service approach and the previous focus there has been in Human Factors Ergonomics and transport research, which has been predominantly focussed on the bus design features (e.g. Brooks et al. (1978); Brooks (1979); Jianghong & Long (1994); Mitchel (2007); Petzäll (1993)). The benefits of such focus on the bus design has led to the design of low floor buses, which enable easier access to elderly, parents with young children, as well as to wheelchair users (Balcombe et al., 2004). The importance of bus design is shown by a study in London that suggested the introduction of low-floor buses along with a free pass has led to widespread use of bus services for people aged 60 and over and for the younger disabled (Schmöcker et al., 2008).

However, it is important to extend the concept of inclusion beyond the physical design of the vehicle since an 'accessible bus' does not necessarily guarantee an 'accessible bus service' (Nickpour et al. 2012:14). For instance, research commissioned by Age UK shows that over 800 older people per day fall on a bus and nearly two million are concerned about falling while a passenger (Department for Transport, 2012). The study of Nickpour et al. (2012) found that overall mobility challenged passengers in London have few problems related to bus accessibility, but they found some psychosocial issues related to the service features and operation. For instance, participants reported negative experiences with drivers because of inconsiderate driving - for example pulling away too quickly - however using a service approach in their study enabled the authors to identify a problem regarding the reliability of the service and the drivers' behaviour. Since reliability is the basis on which the bus companies are judged, bus drivers are under pressure to run on time and such situation sometimes makes them feel unenthusiastic about collecting mobility challenged people.

2. Understanding the gap between users' capabilities, needs and expectations and what the service provision offers to them.

The use of the Demand-capability theory allowed understanding and comparing the capabilities of younger and older users for coping with the demand placed on them by the bus service in a door-to-door journey. While some capabilities could be assessed by existing professional tools –such as HADRIAN (Marshall et al., 2010) and/or the Inclusive Design Toolkit (Clarkson et al., 2011) – their subjective nature highlights that the information can only, or most accurately, come from passengers in real-life environments. This is consistent with Langdon et al. (2013) who argue that among the research requirements for inclusive design, there is a need for better descriptions of the demands made by products and services on the user. In addition, the methods used in this research enabled an exploration not only of users' capabilities, but also their needs and expectations in using the service.

3. The uniqueness of the information gained from older users.

As stated in the literature review, every design decision has the potential to include or exclude customers (Waller et al., 2013). Exclusion results if any of the sensory, cognitive or motor demands of the task exceed any of the corresponding user abilities (Clarkson et al., 2013). Cassim et al. (2007) have suggested that design exclusion does not come about by chance; but through neglect, ignorance, and lack of adequate information and data.

The use of the principle of inclusion in evaluating and designing a service enables the collection of unique data from older people that comprises personal components that would be difficult for people outside of that user group to identify (or understand) the significance of. For instance, in the case of the bus service, stakeholders (who include drivers, bus operators, bus manufacturers, designers and regulators) usually are younger than older passengers, and are unlikely to directly experience for themselves the challenges such passengers face in using the bus. In addition, most of these stakeholders (aside from the drivers) are not in direct contact with such passengers and cannot identify where aspects of the service impact specifically on older passengers.

All in all, the benefits of using an inclusive service design approach in investigating a service are reflected on the abundance of information and data produced from a holistic and inclusive approach. As Clarkson & Coleman (2013:11) state a 'great product or

service is typically built on a foundation of understanding the real needs of the user and other stakeholders’.

The benefits in using this approach in the second stage of this research (the ‘Translate’ as outlined in Section 1.6) are related to the use and development of the *inclusive* service blueprint. Combining service blueprinting and data on users’ capability and the demand that service exerts at any interaction point, enabled further use and development of this visualisation tool. The benefits and usefulness of this tool are discussed below (Section 10.3).

10.2.2 On the approach: generalisation and transferability

In spite of the fact that the approach was applied in the context of the bus service in Mexico, it represents an opportunity to explore and provide insights that might be transferrable for Service Design and Inclusive Design as a potential route in designing better services. This thesis contributes to the discussion of the usefulness of combining principles from these approaches and suggests that both design domains might be recipients of the benefits of such integration.

As discussed in the literature review, it appears that Service Design under-emphasises that users are diverse and possess a variety of capabilities, needs, and desires. This is reflected by the lack of an explicit consideration that users are diverse and the presence of few practical cases reported related to older or disabled people (e.g. Kälviäinen & Morelli (2013); Winhall (2013)). This situation suggests that perhaps in a subconscious way by service designers there is a lack of focus on inclusion. As discussed above, designers - similar to stakeholders - are usually younger than older service users and are unlikely to experience directly for themselves the challenges in using services.

Therefore, given the population trends and that every design decision has the potential to include or exclude customers (Waller et al., 2013), the integration of inclusiveness is essential and can help service designers in reducing the gap between what users need and what services provide.

In addition, as suggested by Sangiorgi (2009) and Segelström & Holmlid (2009), even though Service Design has grown in terms of projects, initiatives and number of practitioners, research related to design using a service perspective has been scarce. For instance, more research is needed in terms of defining ‘quality’ in service interactions and describing how quality can be designed and/or evaluated (Sangiorgi, 2009). The

Capability-demand theory used in the context of Inclusive Design provides useful insights into how interactions can be evaluated in terms of the demand that the service exerts and the ability of users to cope with such demand. Likewise, this research provided the opportunity of using Service Design principles in investigating a real service. As discussed above the application of these principles offered several benefits that might be replicable in investigating different services in other contexts.

Conversely, Inclusive Design might be benefited by the use of visualisation techniques, which are core practices in Service Design, and are claimed as one of its fundamentals (Segelström & Holmlid, 2009). It has been highlighted from an Inclusive Design perspective the need for user data representation in designer-friendly formats (Dong et al., 2013; Langdon et al., 2013; Nickpour & Dong, 2011). As example of this potential, this research developed the *inclusive* blueprint, which combines principles from both approaches through a visualisation technique. However, further possibilities might be explored for integrating visualisation techniques with a sense of inclusiveness.

10.2.3 Its use in context: barriers and enablers

Beyond the benefits discussed above in investigating the service, the last study (reported and discussed in Chapter 9) highlighted that results showed that some stakeholders were sceptical about the real possibility of applying the approach in that context, because of the economic restrictions and the lack of willingness to change from bus operators. There was a series of benefits in using the approach in the context, based on improving understanding amongst stakeholders on the younger and older users' differences, needs and expectations, and the key elements that impose difficulties in using the service. Likewise, stakeholders reported an improvement in their awareness related to the value of designing a more inclusive bus service.

Regardless of actual and perceived limitations for using the inclusive service design approach in that particular context, there has been a series of signals that suggest stakeholder groups were attracted to, and interested in, using the approach for service improvement. Although the workshops aimed to obtain feedback from stakeholder groups on the usefulness of the approach, the results in the context of the bus service in Guadalajara have exceeded this first intention. A series of actions have been undertaken towards improving the service by the Local Authority along with the main syndicate of bus operators (as discussed in Chapter 9).

These stakeholders actions and engagement with the approach is consistent with the ideas of Cassim, Coleman, Clarkson, & Dong (2007) who state that new developments of inclusive design will be in those less advantaged and resourced communities in the developing world. In line with this, Scott (2008) states that ergonomics has more to offer in industrially developing countries, ‘where needs are greatest, than in other areas of the world’, for it is, she continues ‘in these areas that ergonomics has the furthest reaching effects, with benefits impacting far beyond the confines of the working environment’ (Scott, 2008:496).

10.3 Main findings from descriptive studies

Since the results of descriptive studies (Chapters 4, 5, 6 and 7) have already been discussed in each chapter, this section presents a short discussion of their main results.

10.3.1 Different users means different needs

As discussed in the literature review, due to the ageing process older people can experience a decline in function (e.g. motor, visual, auditory, cognitive, or reach and dexterity limitations) (Clarkson et al., 2013; Rogers et al., 1998; Seidel et al., 2009) that results in them having different capabilities than younger people. Since the city and the bus service have not been designed around meeting older people’s needs, results from studies in Chapters 5 and 6 showed that younger and older passengers face different problems and have differing needs in using the bus service.

Based on the ranking that younger and older participants gave in the focus group study (Chapter 5), Table 5.4 shows that each group of participants differently prioritised the issues that impose greatest difficulty in using the bus service. For example the older participants prioritised bus design in second place while the younger participants assigned it fourth place (i.e. it was relatively less important for the younger passengers). ‘Distances to walk’ was ranked in fourth place by the older participants in comparison with almost the last place (8th) assigned by the younger group. Similar positions were assigned by both groups for issues relating to drivers and bus capacity (crowded buses). Nevertheless, older and younger participants expressed different reasons for why each issue was considered at that position. These results are consistent with those found by Broome et al. (2010) in a study with younger and older Australian bus users, in which each group of users expressed different reasons behind identified barriers. However, the prioritisation of the problematic issues in the focus groups study (Chapter 5) was

different to the top ten barriers that Broome et al. (2010) report. In their study unfriendly drivers were placed in sixth place by older participants, and younger participants did not include drivers as a barrier at all; while in this research drivers were ranked highest by both groups of participants. Data from the study in Chapter 4 might help to explain this difference since it implied that poor drivers' working conditions might affect the way that they perform their role as frontline staff. Another significant difference between the studies is that crowded buses are not reported as a barrier by Broome et al. (2010), whereas participants in the focus groups assigned a high position for this issue.

Results from the journey observations (described in Chapter 6) helped to understand and corroborate some of the differences expressed by younger and older participants in the focus groups. For instance, the results of this study suggested that passenger behaviour, and differences between younger and older passengers, were affected by features of the bus service such as bus design and bus driver behaviour. It was observed that the older passengers had more difficulties climbing and descending the steps than the younger passengers, and they took significantly longer to complete these tasks than younger passengers. Older passengers were observed making greater use of handrails, but they were still more likely to lose their balance.

Findings from the study in Chapter 6 cannot be contrasted directly with previous research due the lack of studies providing objective measurements between younger and older people using the bus service. Nevertheless, the study provides evidence to support and understand previous research with self-reports, in which older people have reported problems with the bus design as high steps (WHO, 2007) or inappropriately placed handrails in buses (Carlsson, 2004).

Altogether, evidence from both studies suggests that, due to their differences in capability, each group of passengers has different needs when using the bus. Therefore the needs of each group should be considered in improving the service in order to accomplish a widespread uptake of the bus system by younger and older passengers. A list of specific needs of older people using the bus service in Guadalajara is described below in Section 10.3.4 .

10.3.2 Identified barriers in using the bus service

Throughout the four descriptive studies (Chapters 4, 5, 6 and 7) the main barriers in a door-to-door journey using the bus for younger and older people were identified. Overall the key issues related to: bus drivers' behaviour, poor bus design, crowded buses, other passengers' behaviour, and those problems that people face as pedestrians. This section discusses these barriers and the demand that they placed on users, particularly older ones.

10.3.2.1 Bus drivers' behaviour

This research, through the four descriptive studies, has identified bus drivers' behaviour as one of the main barriers in using the service. Overall, poor driver behaviour was characterised by 1) not stopping to collect passengers; 2) not stopping near to the kerb; 3) allowing only a short time for passengers to board or alight the bus; 4) pressurising the passengers to board or leave the bus quickly; 5) pulling away before passengers are seated; and 6) employing sharp acceleration and braking.

Drivers' behaviour has not been frequently reported as an issue affecting the use of public transport by older people (Broome et al., 2010), which can be explained by the fact that much previous research has focussed more on the physical characteristics of the vehicles or environments. However, results from this study are in line with some research that highlights the key role of drivers as a barrier or enabler in using the bus service. For instance, older Australian bus users reported as a barrier unfriendly and unhelpful drivers (Broome et al., 2010). Drivers pulling away too quickly was reported as an issue by mobility challenged people in London (Nickpour et al., 2012). The report of the World Health Organisation (WHO, 2007) indicates drivers' behaviour as a problem for older people in different cities of developed and developing countries.

The study in Chapter 4 (stakeholders' interviews and document analysis) found that the public blames drivers for poor quality of the service. In the focus groups study younger and older participants reported bus drivers as the greatest problematic issue in using the service. However, interviews with drivers (Chapter 4) and journey observations (Chapters 6 and 7) led to the conclusion that although the problems are exacerbated by drivers' behaviour and the manner in which the buses are driven, this in turn is influenced by the wider traffic infrastructure, behaviour of other traffic, and a lack of regulatory regime which places drivers under time pressure, and in direct competition

with each other. Nickpour et al. (2012) found that the key performance indicators (KPIs) used to measure the performance of the bus operators in London was a contributory factor for drivers not stopping to collect mobility challenged passengers. Polaine et al. (2013) point out that when frontline staff are let down by internal systems and procedures, they become disempowered and inflexible, which usually leads to poor customer experiences and service failures.

10.3.2.2 Bus design features

Bus design was another issue identified by the descriptive studies. The main features affecting older users' experience were 1) the existence of steps at the front entry door and the rear exit door; b) the height and shape of the steps; 3) the position of the handrails; and 4) the fact that buses were typically built on an adapted truck chassis, with a stiff suspension and manual gear change.

Older bus users in this research reported and were observed having problems boarding and alighting the bus. These problems have been widely reported in previous research (e.g. Glasgow & Blakely (2000); Rogers et al. (1998); WHO (2007)), but they have been also part of the research and interventions from the Human Factor Ergonomics discipline (Brooks et al., 1978; Brooks, 1979; Petzäll, 1993). Another common problem was the lack of appropriately located handrails, which was also reported by people with functional limitation in Sweden (Carlsson, 2004).

Results from the observational study (described in Chapter 6) suggest that only 14% of the journeys were considered 'smooth' over their entirety, and over 50% had frequent and extended periods where there was considered excessive lateral, longitudinal or vertical acceleration, and resulting passenger instability. The stability of a journey depends on acceleration or deceleration, which is determined mainly by the driving skills (Karekla & Tyler, 2012) and style employed (e.g. sharp acceleration away from bus stops). However, the method used in this study enabled realisation that the effects of acceleration and deceleration were exacerbated by poor road surfaces and stiff suspension due to the truck chassis, the manual gear-change, and road design and heavy traffic conditions. The sort of suspension and transmission are not a characteristic frequently reported as having an impact on use of the bus service by older people. This difference could be attributed to the fact that previous studies have explored the use of

buses through self-report methods (see Broome et al., 2009) or laboratory experiments (see Karekla & Tyler, 2012) which do not allow observation of actual journeys.

10.3.2.3 Crowded buses and other passengers' behaviour

Results from the three descriptive studies suggested that crowded buses represent a barrier in using the bus service for both younger and older people. Overcrowding has been reported as a problem for older people using buses. The report of the World Health Organisation (WHO, 2007) indicates that is commonly identified in cities from developing countries, however it has been suggested as a problem in cities from developed countries (Carlsson, 2004), and it seems likely to increase in the future as more and more people are using buses (Nickpour et al., 2012).

Younger and older participants in this research expressed the view that when buses are crowded 'everything gets worse' and that it is sometimes simply impossible using the bus service in those conditions. Older participants stated that younger passengers do not have consideration towards them. It appears that few studies have reported older people having problems with other passengers (e.g. Coughlin (2001); Nickpour et al. (2012)), which can be explained by the fact that usually research focusses on the physical elements of the service.

10.3.2.4 Problems that people face as pedestrians

The study in Chapter 4 (stakeholders' interviews and documentary analysis) found that there is a high dependency on the private car in Guadalajara city, and that there has been little investment in other mobility options, including options for pedestrians.

Results from the studies in Chapters 5 and 7 identified the presence of several barriers for older people on their way to, or coming back from the bus stop. These barriers were long distances, crossing roads, poor pavement conditions and obstacles along them, heavy traffic and no pedestrian traffic lights, and lack of bus stops. Some of these problems, along with poor weather conditions, have been reported in previous studies as barriers to the use of the bus service by older people (Broome et al., 2009; Lavery et al., 1996; Marsden et al., 2010). However, the accompanied journeys with older people enabled the research to observe and obtain a deeper understanding of the implications of these barriers on the older people experience. For instance it was noted that poor pavements conditions and/or presence of obstacles 'forced' all the participants to

stepping off the pavements and walking into the road, which represents a risk due the traffic.

10.3.2.5 Combination of barriers: the main effect

Some the barriers identified in this research have been reported in previous studies (as discussed in sections above). However, the barriers are reported as isolated issues hindering the use of the bus service, i.e. barriers are listed (see for instance Broome et al. 2009) without discussion of the combination effect between them. In this research the blend of methods enabled ascertaining that the impact on the younger and older users' experience is not due to isolated barriers, but rather a combination of them. Each part of the process for using the bus service involves a series of different problematic issues for older passengers, e.g. difficulties in boarding the bus might comprise: the lack of bus stop or pavement (infrastructure); if driver wants to collect the passenger or not (driver behaviour); if the driver stops the bus near to the kerb (driver behaviour), if not, then the passenger has to ascend the first step from the ground which is 40cm high (bus design); the passenger feels compelled to board quickly because the bus driver appears to be in a hurry (driver behaviour and service operation); the passenger then climbs the rest of the stairs, pays the driver and moves to a seat, in the absence of well-designed handrails (bus design), while the driver has driven off since the passenger was on the first step potentially destabilising the passenger (driver behaviour and service operation).

10.3.3 Understanding the demands placed on older users in a door-to-door journey

As stated in the literature review, there is a need for better descriptions of the demands made by products and services on the users (Langdon et al., 2013). The analysis of findings of this research allowed identification of the demand at each service interaction point. The interactions points that place higher demand on older users were: 1) decisions on using the bus service, 2) crossing roads, 3) boarding the bus, 4) walking to the seat or to the exit door, 5) travelling standing, and 6) alighting from the bus. It seems possible that these results are due to these actions comprise tasks which have been referred to as high demand tasks for older people (Maki & McIlroy, 1997; Redfern et al., 2001; Startzell & Owens, 2000) such step negotiation (climbing up and down stairs) and postural control whilst the bus is moving. Moreover, the degree of the demand was compounded by the combination of several facts like drivers' behaviour and bus design (as discussed in the previous section).

10.3.4 Designing an inclusive bus service: beyond usability and comfort, safety first

Whilst most of the research on bus use and older people has focussed on usability problems (e.g. Carlsson (2004); WHO (2007)) findings from this research suggest that the main impact on older users experience relates to safety. Thus, older participants in the focus groups study expressed more concerns related to actual and perceived safety, followed by usability problems, and with fewest concerns related to comfort (as shown in Figure 5.4). In the journeys observations it was ascertained that passengers, particularly older passengers, were under risk of falling when boarding, moving inside the bus and alighting from the bus. All the participants in the accompanied journeys study expressed concerns over being physically hurt at some stage whilst using the bus service. What the data is suggesting is that older people's ability and willingness to engage with the bus service is highly related to fear of falling. These findings are consistent with the limited literature that reports older people experiencing fear of falling when using the bus service (Department for Transport, 2012; Marsden et al., 2010).

As discussed in Chapter 5, using the Bonapace's (2002) model to analyse and interpret the current results, it can be inferred that older participants expressed less concerns regarding the impact on their comfort (which could be considered as 'pleasure' in the model) because they were mainly concerned with their own safety (safety and well-being), and on the difficulties to use the service (usability).

Altogether, findings from the descriptive studies suggest that in order to use the bus service, older people need and expect:

- Confidence that they are safe when using the service
- Even pavements free of obstacles
- Respect from other road users and bus passengers
- Pedestrian traffic lights and enough time for crossing roads according to their capabilities
- Sheltered bus stops with seats
- Buses without overcrowding
- Assurance that drivers are stopping to collect them
- Buses without high steps

- Drivers stopping near to the kerb
- Trained drivers that are aware of their capabilities and needs and act consequently, e.g. drivers that are more patient and courteous towards older passengers
- Sufficient time for boarding and moving to a seat before drivers drive off
- A seat to travel in
- Enough time for moving to the exit door and alighting from the bus

In addressing these older people's needs and expectations, service providers can ensure better quality levels in the service and accomplish a widespread uptake of the bus system by passengers with different needs and expectations.

10.3.5 Generalisation of results from descriptive studies

This research has focussed on investigating and comparing bus use in a developing country, in relation to younger and older passengers. Results in Section 5.5.1 indicate that more than 80% of the younger and older participants in the focus group and accompanied journeys studies reported a monthly income of less than \$3500.00 MXN (about 160.00 GBP) which suggests that many of them may use the bus service due to 'need' rather than 'choice' since they may not be able to afford alternatives such as running a car or using taxis. This is in line with Ipingbemi (2010) who argues that in developed countries where the private car still represents the preferred mode of satisfying mobility needs by older people, the situation is different in developing countries where this group of people uses public transport.

In general terms, it can be said that similar conditions exist in other cities in developing countries. Previous studies indicate the presence of comparable characteristics in the bus systems in Dhaka, Bangladesh (Katz & Garrow, 2012) and Ibadan Nigeria (Ipingbemi, 2010). In addition, findings from this research reinforce those that the study of the World Health Organisation found in developing countries (WHO, 2007). This situation highlights that many older people in developing countries might experience great difficulties in using buses or may not use them at all. The implications of such a situation relate to a reduced quality of life of the elderly. Table 5.3 shows the importance of the bus service in supporting the health and wellbeing needs of older people within the Guadalajara city; their main reason for using the bus was to access medical services (health) followed by shopping, visiting family and friends and

participating in social activities (wellbeing). In this context, the current bus service, which does not consider user differences and needs, implies a sort of social exclusion for the older population because many older people might not be able to use it. This is in line with those that have pointed out that Human Factors Ergonomics and Inclusive Design have much to offer for improving the living conditions of people in developing countries (Cassim et al., 2007; Guimarães & Soares, 2008; Scott, 2008).

Aside from the bus design features, the barriers identified in this research have been also reported as barriers in cities of developed countries. Such is the case of bus drivers' behaviour, crowded buses, other passengers' behaviour, and problems as pedestrians. In addition, the fear of falling of older people using the bus service appears to be a problem irrespective of the level of development of the countries. This underlines what Nickpour et al. (2012) state: that an 'accessible bus' does not necessarily guarantee an 'accessible bus service'.

10.4 Assessing the use of the *inclusive* service blueprint

The *inclusive* service blueprint was a tool developed (as described in Chapter 8) in order to translate raw data from the descriptive studies into useful insights and to communicate these insights to the bus service stakeholders. The process of building the blueprint represented a series of challenges, from understanding the capability demand made by service at each interaction point; analysing data to determine user capability; estimating the level of difficulty; and finally presenting data in an usable and desirable way - as suggested by Clarkson & Coleman (2013); Nickpour & Dong (2011).

The uniqueness of this blueprint is its explicit incorporation of inclusiveness because a typical service blueprint only describes customer actions, but it does not consider the diversity of users and their abilities, needs and expectations. As discussed in Chapter 9, service blueprints help to identifying potential points of failure and highlight opportunities to enhance customers' perceptions of the service (Chuang, 2007; Polaine et al., 2013). However, this inclusive blueprint (discussed further in Chapter 9) helped to visualise and communicate: 1) the difference in the level of difficulty using the service for younger and older people, 2) how the gap between personal abilities and environmental demands become wider for older people, 3) the points of interaction associated with higher level of difficulty, particularly for older users; and therefore the inclusive blueprint provides a set of priorities for designing a more inclusive bus service.

Furthermore as discussed in chapter 9, an inclusive service blueprint can allow the representation of other groups of users like disabled people, pregnant women, parents with pushchairs or travellers with a piece of luggage.

Despite possible limitations in designing the format and content of the blueprint, participants indicated that the blueprint was very useful in visualising and communicating the difference in capabilities and needs between these two groups of users; similarly, they formally rated the blueprint as easy to use and understand. In addition, its use in the workshops helped in attracting the participants' interest towards the approach. Overall, results indicated the blueprint was considered as a useful, usable and attractive tool. Similar characteristics have been previously indicated as specifications for potential anthropometric data tools for presenting data to designers (Nickpour & Dong, 2011).

An advantage of service blueprinting is that it provides a common platform and a point of discussion for all stakeholders in order to participate in service improvement (Bitner et al., 2008). An extra advantage of the *inclusive* service blueprint is that it enabled focussing the discussion on older users' needs and therefore on the generation of ideas for a more inclusive bus service.

10.4.1 On using the blueprint: generalisation and transferability

As discussed in the literature review, service blueprinting provides a number of advantages and has been successfully used in service innovation and service improvement in different service sectors around the world (Bitner et al., 2008). This discussion then should not be focussed in whether the service blueprinting technique can be transferable to other services, but on the benefits of transferring the use of the *inclusive* service blueprint to Inclusive and Service design domains.

Since the use of visualisations is a core practice in Service Design (Segelström & Holmlid, 2009), the introduction of the *inclusive* service blueprint – or other *inclusive* visualisation tools – to the service designers community might potentially promote more inclusive design. Segelström & Holmlid (2009) found that visualisations are frequently used in the first stage of the design process; therefore the existence of *inclusive* visualisation tools might increase awareness amongst service designers on the fact that users are diverse and possess a variety of capabilities, needs and aspirations.

Through this, service designers could ensure that services are useful, usable and desirable from ‘a broader range’ of users’ perspectives.

As discussed in the literature review, besides investigating users’ capabilities, Inclusive Design research has been focused on identifying the designers’ knowledge needs and communicating data to designers (Dong et al., 2013). Research results suggest that designers prefer ‘information that is quick and easy to find and use, visual and stimulating, flexible and open-ended, and relates clearly and concretely to design issues’ (Goodman, Langdon, & Clarkson, 2007:125). In a study using interviews with designers Nickpour & Dong (2011) found that there was very limited use of physical ergonomics data among experienced designers, in part because the existing anthropometrics data tools lack ‘usability’, ‘usefulness’ and ‘desirability’. These authors argue that there are frequently communication difficulties between ergonomics and design disciplines, resulting in poor use and application of ergonomics data in the design process. This situation can be linked to what one design student expressed in the workshops study (Chapter 9):

‘During my Master studies I have seen different ergonomics tools, but I think this (blueprint) brings more advantages because it gives clarity to the analysis and allows faster progress. It meets the ease of looking at things on an individual basis, but also in a global way. As a tool it seems to me very interesting’

The development of the inclusive service blueprint then contributes to addressing the lack of tools that support effective communication of user data in the design process (as discussed in Section 2.4.5). Since one of service blueprinting’s greatest strengths is its versatility and flexibility (Bitner et al., 2008), it can be used in combination with other tools like ‘personas’ that are commonly used in Inclusive Design. For instance, a set of younger and older ‘personas’ can be used to show how a ‘persona’ experiences the interaction with the service process (illustrated on the blueprint) and then demonstrate how users capabilities match or otherwise the demand that service exerts matches.

Furthermore, an inclusive service blueprint can be used as a tool for teaching Inclusive Design. Dong (2010) has identified a number of challenges of teaching inclusive design to undergraduate students. Among these challenges are 1) the size of class teaching, typically ranging from 100 to 300 students, which makes user-involvement in the

course very difficult; 2) the lack of case studies at appropriate levels and depth. According to the author, among the identified difficulties by lecturers who teach inclusive design at degree levels are: 1) getting students to think of the consequences of impairments on user abilities; and 2) identifying the implications of such impairments within realistic situations is not always easy. Dong's study found that the use of 'scenarios' and 'personas' works as a strategy to engage large groups. The inclusive service blueprint could be combined with 'personas' as part of a similar strategy. In addition, the inclusive service blueprint might be able to illustrate the implications of declining capabilities in a realistic situation like everyday services. For instance, an inclusive service blueprint could be developed for banking services, and such blueprint might be able to show the tasks which place higher demand on older users, e.g. using the cash machine or understanding information.

Beyond communicating user data to designers, in this research the *inclusive* service blueprint was successfully used as a tool for communicating to stakeholders, data coming from the domains of Human Factors-Ergonomics, Service Design and Inclusive Design. Service blueprints can be printed out or stored electronically and made accessible to everyone involved in designing or improving the service; and they can be used for training and other purposes (Bitner et al., 2008). As example of this, the inclusive blueprint developed in this research is currently available in the Guadalajara Local Authority's website (<http://ijam.org.mx/files/blueprint.pdf>), and the Local authority and Service Operators are currently using the blueprint as part of a programme for drivers' training.

Although, currently there are no research results on what is happening on that training programme, results from the workshops study (Chapter 9) suggested that after the workshop drivers had improved their understanding of older people capabilities and needs, and had also developed greater empathy with older users. Among their comments were: 'as drivers we should change'; 'we should have more empathy with older users'; and 'we should be more patient with them'.

10.5 Reflections on the methodology used

10.5.1 Added value of using a mixed methods approach

A key component in the design process is gathering insights into the capabilities, experiences, desires and needs of the user, often facilitated through the use of

qualitative and quantitative research methods (Johnson et al., 2010). This research therefore embraced the use of mixed methods approach as the route to address the research questions.

As stated in Chapter 3, the central premise of the mixed methods approach is that the use of both approaches, in combination, provides a better understanding of research problems than either research alone (Creswell & Plano Clark, 2011). Among the advantages of using this approach are that: 1) it provides strengths that compensate for the weaknesses of both qualitative and quantitative research (Johnson & Onwuegbuzie, 2004); 2) it provides more evidence for studying a research problem; 3) it encourages the use of multiple worldviews (Creswell & Plano Clark, 2011).

Consequently, the use of the mixed method approach in this research allowed 1) reducing the limitations of methods used in each study, (e.g. limitations of self-report in focus groups was compensated with quantitative data coming from the journeys observations); 2) collection of a large amount of qualitative or quantitative data; and 3) obtaining an understanding from multiple perspectives on the bus customer experience, based on what they said, what they were observed doing, and how they felt when actually undertaking a door-to-door journey.

The use of different methods also enabled contrasting and clarifying data from each method. Whilst there were several incidences of corroborations e.g. the issues relating to step height and crowded buses, there were also some notable differences in the results obtained with specific methods. For instance, with respect to how the passengers attributed poor service quality and the root causes, drivers were blamed for the stability of the journey. However whilst the stability of a trip depends on vehicle acceleration or deceleration, which was determined mainly by the driver's driving skills, it was also noted through the observations that trip stability was also affected by the bus design (manual transmission and rigid suspension) and the road surface conditions (uneven roads or with potholes).

Such level of understanding had not been possible using only one of those methods, and therefore demonstrates how design interventions based on single methods could be based on misunderstanding the data. In summary, through the use of mixed methods approach, designers can garner deep insights to reduce the gap between what users expect or need and what service providers actually make available to customers.

10.5.2 Methodological challenges and limitations

Although, the use of the mixed method approach provides a number of benefits, it also implies some limitations and challenges. Authors from this research paradigm agree that the main limitations are related to the research skills and time needed to carry out the research project (Creswell & Plano Clark, 2011; Johnson & Onwuegbuzie, 2004). The use of this approach ‘forces’ the researcher to learn the skills to conduct both qualitative and quantitative research, as well as to mix them appropriately. Similarly, the use of this approach may require extensive time and effort on the part of the researchers.

Thus, the development of this research project implied the acquisition of new and multiple skills, in order to conduct five different studies with diverse perspectives. Each study represented particular challenges either for data collection or data analysis. Qualitative studies provided plenty of data that demanded to be transcribed and then thematically analysed. In turn, quantitative studies provided numbers that required capturing and analysing statistically. Overall, dealing with qualitative data was more time consuming, however this enabled determining the meaning of the quantitative data.

Another challenge in this research was raised by the participation of older people, i.e. their participation had an impact on the way the research was planned and carried out. The focus groups were planned following a series of recommendations to fit with capabilities and needs of older participants (Barrett & Kirk, 2000). In the same way, the accompanied journeys represented a series of challenges and ethical issues. As discussed in Chapter 7, due to the presence of safety issues inherent in the context of this study, the researcher sometimes had to intervene to avoid injury to the participant.

Finally, the distance of the case of study (Mexico) from the UK created a series of challenges in carrying out this research. The process of engaging participants, finding convenient times for their participation, and planning and carrying out the interviews or focus groups implied a series of factors which was not always easy to control. This process was particularly difficult with the studies involving service stakeholders due to the need for ongoing discussions with them in order to build good relationships prior to their participation.

Chapter 11 Conclusion and future work

11.1 Introduction

This chapter concludes this thesis connecting the overall findings to the research aims and objectives. The chapter describes what are considered the main contributions of this research and its impact on the '*real world*'. The last section of the chapter identifies areas for future work.

11.2 Returning to the aims and objectives

The research detailed in this thesis was undertaken in response to the lack of inclusive services in the context of the ageing population identified in Chapter 1. This research then aims to contribute to the evaluation and design of 'inclusive services'. The specific aims of this thesis have been 1) to explore and evaluate the design of inclusive services by integrating theory and approaches from the domains of Service Design and Inclusive Design; and 2) contribute to the bus service improvement in Guadalajara, Mexico through applying the inclusive service design approach.

These aims have been achieved through addressing the objectives detailed in Sections 1.4 (Chapter 1). The following subsections describe how the objectives were addressed through the research activities. Each subsection provides the main findings and conclusions from these activities.

11.2.1 Objective 1

- **To explore possible ways of integrating theory and methods from the domains of Service Design and Inclusive Design for the evaluation and design of better services.**

This objective was mainly achieved through the literature review (Chapter 2), which enabled identifying principles, methods and practices from both design approaches that can be useful in evaluating and designing inclusive services. However, this knowledge provided direction for the empirical work, which included the holistic and inclusive approach used in understanding users' capabilities and needs (Chapters 5 to 7) and the current bus service provision (Chapters 4 and 6), as well as the development and evaluation of the inclusive service blueprint (Chapters 8 and 9). This empirical work,

with the main conclusions drawn from the results, is detailed under the objective 2. The main conclusions from this literature review relating to this objective were:

- Service Design provides a framework for considering the design of services in a holistic manner. It links to the Human Factors discipline since in undertaking this holistic approach it recognises that all the human elements within the system (related to multiple stakeholders) need to be considered.
- Inclusive Design provides a framework for considering the capabilities of the broad range of users who will use the service. It links to the Human Factors discipline since it recognises that a good fit between the users and the system is dependent upon (1) a full understanding of the capabilities of all users and (2) ensuring that these are not exceeded by the design of the service at the points of user interaction.
- Principles, methods and tools from Service Design and Inclusive Design can be combined and used as an approach in investigating and designing inclusive services. Both approaches –Inclusive Design and Service Design- appeared to be complementary in this respect.

11.2.2 Objective 2

- **To identify the key issues that prevent the bus service being safe, usable and desirable for passengers, and the demand that these issues place on younger and older users.**

To achieve this objective a literature review and four empirical studies were carried out. This time the literature review focussed on previous knowledge on ageing and public transport, with particular emphasis on finding out the barriers in using the bus by older people. The review revealed that a number of preceding studies have investigated the difficulties faced by older bus passengers. However, based on the analysis of the current literature, the following gaps were found:

- Most of the studies have been undertaken in developed countries and there appeared little evidence of such research in developing countries;
- Only one study was found which investigated whether the barriers in using the bus differed between younger and older people (Broome et al., 2010);

- The majority of the studies have used methods such as focus groups, interviews or surveys. Although these methods are useful, they lack the objectivity in data collection that is desirable, particularly in terms of presenting evidence to stakeholders to promote service improvement.;
- Although the research has identified a range of barriers, there is a lack of studies with a focus on priorities for interventions;
- Only one study was identified using a holistic service approach (Nickpour et al., 2012).

The presence of these gaps along with the inclusive service approach used in this investigation suggested the need for using a mixed method approach to address the objective. A total of four studies were undertaken to tackle these gaps. Study 1 focussed on understanding the bus service context in Guadalajara, Mexico. Study 2 focussed on identifying and prioritising bus service issues and their impact on younger and older people experience. Study 3 focussed on investigating differences in the gap between personal abilities of younger and older passengers considering the demand that using the bus exerts. Building on the studies 2 and 3, study 4 focussed on obtaining a deeper understanding of the barriers that older people face in a door-to-door journey.

The following are the main findings from Study 1:

- There are several gaps and weaknesses on the regulation of the bus service, e.g. although, there is legislation to promote social inclusion of older and disabled people, there is still a large gap related to its application.
- The bus service is based on an informal organisation comprising people who own their own bus and who work in ‘competition’ with others. Bus operators seek to maximise profits, even if that means competing against other providers on the same route or not providing a good service for users.
- Bus drivers are paid by the number of collected passengers, and so they compete, race and ‘fight’ with other bus drivers. Drivers’ working conditions include shifts of up to 13 hours without fixed breaks, and they do not receive proper training for doing their job.
- Drivers are blamed for the poor quality of the service.
- Buses are designed on a truck chassis due to the lower cost. Purposefully-designed buses are too expensive for a single owner.

- Over the last decade the bus service has lost about half of passengers who have preferred using the private car.
- Despite the lack of quality of public transport, most of the population still uses this mode of transport because they cannot afford private transport.
- There is an increasing pressure from some NGOs for the inclusion of older and disabled people.

These findings led to conclusion that it is important that the design of the service considers not only bus users' views (customers/passengers), but those of bus drivers, operators, manufacturers, local authorities, and other relevant stakeholders. It is proposed that is vital to consider the role played by people behind the drivers in providing the service. Overall this study confirmed the compelling necessity for a better bus service in the city, and enabled a good insight into the broader factors affecting the bus service.

The studies 2, 3 and 4 provided data relating to the users' experience and how these experiences are affected by the service components. The following are the main conclusions from these studies:

- The key issues that prevent the bus being safe, usable and desirable for passengers, particularly older ones, are related to: bus drivers' behaviour, poor bus design, crowded buses, other passengers' behaviour, and those problems that people face as pedestrians. These findings can be used for prioritising areas of intervention for service improvement.
- Although younger and older users' expressed concerns about the same bus service elements, each age group stated different reasons for those problematic elements, with older people experiencing additional and more serious limitations when using the bus service.
- The interaction points that place higher demand on older users were: 1) decisions on using the bus service, 2) crossing roads, 3) boarding the bus, 4) walking to the seat or to the exit door when bus is moving, 5) travelling standing, and 6) alighting from the bus.
- The use of the bus service implies a series of tasks, such as climbing up and down stairs or moving towards a seat when bus is moving, which are among the

most challenging and hazardous types of locomotion in the daily living of older people.

- Given declining functionality due to the ageing process, the gap between personal capabilities and bus service demands becomes wider for older people.
- There was evidence that only the most able of the older population used the buses, and they took significantly longer to board and alight than younger passengers, made greater use of handrails, but were still more likely to lose their balance.
- The bus service, through vehicle design and driving style, has the potential to reduce passenger safety due to loss of balance which can lead to older passengers falling which can have a negative impact on their health.

Data from the three studies enabled the conclusion that the design of the bus service should consider that younger and older users have different needs. It is important to consider issues that affect safety since they had a major impact on older people, but also on other group of users, e.g. pregnant women or children. However consideration should also be given to the usability issues experienced by older users. Obviously, it is also very important to consider those issues that produce discomfort to the users, older and younger.

11.2.3 Objective 3

- **To develop, test and evaluate a practical visualisation tool that can be used to communicate the younger and older users' differences to designers and stakeholders in order to help in designing inclusive services.**

An important part of this research aimed to develop a visualisation tool that could be used for the bus service improvement. This was achieved in Chapter 8, which focussed on translating the data on younger and older users as well as the context of service provision gathered in studies 1 to 4 (Chapters 4 to 7) into an inclusive service blueprint. The key features of this blueprint are that:

- It illustrates the difference on younger and older people's experience and needs in using the bus service,

- It visualises differences in the level of difficulty using the service for younger and older people,
- It provides a means for contrasting the ideal service and user experience within the existing service,
- It helps in demonstrating visually how the gap between personal abilities and environmental demands become wider for older people.
- It suggests that in addressing older people's needs in improving the service, the needs of younger people might be considered as well,
- It shows the points of interaction associated with higher level of difficulty, particularly for older users; and therefore it provides a set of priorities for designing a more inclusive bus service.
- It provides the main barriers that need to be addressed in order to reduce difficulties for users and to increase uptake of the service.
- In addition, it illustrates the broader context affecting the service and the role played by people behind the drivers in providing the service (Backstage).

11.2.4 Objective 4

- **To explore how inclusive service design can be potentially useful for service improvement in the context of the bus service in Guadalajara, Mexico.**

Study number 5 (Chapter 9) was carried out to evaluate the usefulness of the inclusive service approach and blueprint tool in the context of the bus service in Guadalajara. The main purpose of this study was to put the approach and blueprint in the context where data was generated, and obtain feedback from the service stakeholders. The main conclusions from this study are:

- The inclusive service design approach and the blueprint tool were useful to engage the stakeholders' interest and to make them consider using the approach as a basis for service improvement.
- The inclusive approach allowed stakeholders to improve their understanding relating to the fact that younger and older users are different, and therefore have different capabilities and needs that should be considered in the service provision.

- The approach enabled stakeholders to obtain a better understanding relating to: 1) issues of the bus service that are critical in meeting the needs of younger and older users; 2) the relevance of considering each individual aspect of a service in a door-to-door journey; and 3) the key role played by people behind the frontline staff (drivers) in providing a better service.
- The inclusive service blueprint is an effective tool for visualising and communicating the difference in capabilities and needs between younger and older users.
- The use of both the general approach and specific tool enabled stakeholders to focus on the generation of ideas for a more inclusive bus service.

11.3 Contributions to the knowledge

This research has provided a number of contributions to knowledge in Human Factors, Inclusive Design and Service Design domains. These contributions are outlined in the following subsections. The last subsection also enumerates the research publications that have been published so far as a result of this research work.

11.3.1 Integration of the inclusive service design approach

Based on the combination of theory and methods from the domains of Service Design and Inclusive Design, a novel way of evaluating and designing inclusive services has emerged from this research. This integration has been termed in this thesis as ‘inclusive service design approach’. Although both domains have the potential to individually transform services into more functional, usable, desirable and viable ones (Clarkson et al., 2007; Mager & Sung, 2011), this thesis was underpinned on the idea that the combination of approaches can maximise benefits when designing services.

As discussed in Chapter 10, the approach employed in this thesis represents an opportunity to explore and provide insights that might be transferrable for evaluating and designing better services in different service sectors around the world. Thus, this research contributes to the discussion of the usefulness of combining principles from these approaches and suggests that both design domains might benefit from such integration.

11.3.2 Application of the inclusive service design thinking in a developing country

Inclusive Design and Service Design have emerged and mostly been applied in the context of the *developed* world. However, authors from the Inclusive Design perspective have suggested that new developments of this discipline will be in those less advantaged and resourced communities in the *developing* world (Cassim et al., 2007) where the needs are greater than in other areas of the world (Scott, 2008). This research provides an example of the application of this design thinking on evaluating the bus service in a developing country and contributing to its improvement. The stakeholders' engagement with the inclusive service approach and the actions that they have implemented suggest that the use of this approach has achieved a positive impact so far. The impact of the approach in the context of the bus service in Guadalajara is detailed in Section 11.4.

11.3.3 Bus use by older passengers in the *developing* world

As discussed in the literature review, much of the research on ageing and bus use has been undertaken in *developed* countries (see Broome et al. (2009)) where the existence of regulatory and legislative regimes encourages the transport operators to provide a good transport service. Fewer studies have investigated older passenger bus use in the *developing* world where transport services often lack such requirements. This research contributes to understanding the barriers that older people face when using the service in the context of a *developing* country. Although most of the barriers identified in this research have been previously reported in the literature describing the developed world, such barriers are more widespread and their impacts on older people can be more severe in the context of the *developing* countries, especially when legislation either does not exist, or is not robust enough to be effective.

11.3.4 Using a holistic approach in evaluating the bus service use by older people

Another limitation identified within the literature is that although some studies have investigated problems that older people face along the travel chain, they are focussed on the end user and do not consider the bus service as a whole (see Broome et al, (2010); Carlsson, (2004)). The holistic service approach used in this research better helped to understand bus usage within the context of a system and the level of service it provides

to its users, as well as improve the understanding of the needs of stakeholders providing the service, e.g. bus drivers. The only study found previously reported using a holistic approach to evaluating the accessibility of public buses (Nickpour et al., 2012) suggests that poor drivers' behaviour can be understood through the consideration of broader components of the service operation.

11.3.5 Using a mixed method approach in investigating the bus service use by older people

From a methodological perspective, the literature review suggested that the vast majority of reported studies have used self-report methods (e.g. interviews, focus groups and surveys) as the primary source of data (see Broome et al. (2009); Davey (2006); Rogers et al. (1998)). Although these are useful, they lack the objectivity in data collection that is desirable, particularly in terms of presenting evidence to stakeholders to promote service improvement. This research embraced the use of a mixed methods approach as the route to address the research questions. Studies 2, 3, and 4 (focus groups, journey observations and accompanied journeys) provided qualitative and quantitative data on the capabilities, needs and expectations of the users. Such kind of data is a key component in the inclusive design process (Johnson et al., 2010).

11.3.6 Comparison between younger and older bus passengers

Similarly, the literature review suggested the lack of research explicitly comparing older and younger passenger experiences. Only one study was found investigating through self-report the barriers and facilitators in using the bus by these age groups (Broome et al., 2010). Studies 2 and 3 compared explicitly the differences between younger and older users. A major strength of this research was the use of these two methods which enabled the researcher to contrast and corroborate what younger and older participants reported within the focus groups with what passengers were observed doing, as well as investigate the characteristics of the service that participants reported as problematic. The results enabled attributing older passengers' difficulties to the limitations induced by ageing, as well as the characteristics of the bus service.

11.3.7 Inclusive service blueprint

The development of the inclusive service blueprint is a practical contribution from this research. It has been suggested that there is a need for better descriptions of the demand made by product and services on the users, related to more accurate user data,

represented through designer-friendly tools (Dong et al., 2013; Langdon et al., 2013; Nickpour & Dong, 2011). The inclusive service blueprint provides a visualisation of the gap between the demands that the environment and bus service place on users' capabilities. As discussed in Chapter 10, the inclusive service blueprint can be transferable to other services and provide several benefits for Inclusive and Service Design domains.

11.3.8 Research publications

As a result of the research carried out in this thesis, some research publications have been produced so far:

- Aceves-Gonzalez, C., Cook, S., & May, A. (2014). Inclusive service design: In search of better services. In M. Soares & F. Rebelo (Eds.), *Advances in Ergonomics In Design, Usability & Special Populations. Part III* (pp. 10–19). United States of America: Published by AHFE Conference © 2014.
- Aceves-Gonzalez, C., Cook, S., & May, A. Bus use in a developing country: Implications for the health and wellbeing of older passengers. *Journal of Transport & Health* [Under review]
- Aceves-Gonzalez, C., May, A., & Cook, S. An observational comparison of the older and younger bus passenger experience in the developing world. *Ergonomics* [Under review]

11.4 Impact on the 'real world'

An integral part of the aim of this research was to contribute to the design of a more inclusive bus service in Guadalajara, Mexico through applying the inclusive service design approach. Whilst the studies 1 to 4 contributed to understanding the bus system and the problems that younger and older passengers face when using the service, the use of the approach and blueprint in study 5 has generated a series of stakeholders' actions aimed at the provision of a safer and more usable service for older people. These actions were described broadly in Chapter 9 (Section 9.5.7.4); here there is a synthesised list of them:

- Participation of the researcher in a press conference in Guadalajara, in which was present the Minister of Mobility, a member of the local parliament and a number of the most influential businessmen in transport. The Minister of

Transport and the member of the parliament expressed the intention to consider the outcomes of this research for improving the service and making some changes to the respective official standards in order to provide a safer service for older people. The session with the media produced news on the TV, radio and in the local press. Section 9.5.7.4 shows images and more detailed information of the press conference.

- The design department of a bus manufacturing company has been in contact with the researcher to discuss some ideas for improving the bus design. These discussions have focussed on physical accessibility onto and through the bus. This company is one of the main bus suppliers to Guadalajara city, but also supplies buses to other cities in Mexico, including Mexico City.
- Some stakeholder groups requested the blueprint tool for future use. For instance, the Local Authority requested permission to upload a digital version of this blueprint to their website (<http://ijam.org.mx/files/blueprint.pdf>).
- The researcher has been invited to evaluate and give some recommendations on the Standard SM/IMTJ/002/2014 (Gobierno de Jalisco, 2014) which regulates bus design. The main contributions from this research in improving the Standard are related to changing the broad structure of the bus, i.e. no buses built on truck chassis; nor rigid suspension and manual gear changes; it has been suggested that there is a reconsideration of seat pitches and handrails location based on passengers dimensions and physical capabilities.
- Recently, the local authority, in collaboration with the main syndicate of bus operators, is developing two programmes based on the results of this research and using the inclusive service blueprint as a tool:
 1. The first programme, already implemented, consists of training bus drivers to offer a better service specifically for older and disabled users.
 2. The second programme consists of an advertising campaign, using the buses themselves as media for delivering the message. The intention is to raise awareness among bus users about the implications of being older and using the bus service.

See Appendix P which shows a collection of evidence including the document used by the local authority when presenting the two programmes mentioned above. Although the document is in Spanish, it shows clearly that programmes are based on the

information contained on the inclusive blueprint, which is also being used as a tool for drivers' training.

11.5 Future work

This research has highlighted a number of potential areas for future research that have come out of this thesis. These areas are outlined below.

11.5.1 Definition of inclusive service design

This research has proposed using an inclusive service approach to evaluate and design inclusive services. The components of this approach have been described and discussed in the literature review (Chapter 2) and in the general discussion (Chapter 10).

Nevertheless, future work needs to be done to develop a more complete definition of inclusive service design.

11.5.2 Transferability of the inclusive service approach

This thesis has discussed the transferability of the approach in evaluating and designing services in different sectors around the world. This research focussed on the bus service since it has been highlighted how important this service is for the quality of life of older people. Future research could use the approach in evaluating the bus service in other *developed* or *developing* countries, or in evaluating other services that represent relevant benefits for older users. For instance, health services could be a suitable area for using the approach, i.e. it may be an area where older people might need to receive accurate support.

11.5.3 Transferability of the inclusive service blueprint

This research evaluated the use of the inclusive blueprint in a particular context and with specific stakeholders. More research is needed in order to test the usefulness and the potential that this thesis has identified that the blueprint may have. In addition, more work is needed in order to develop an accurate and generalisable methodology for designing such a tool.

11.5.4 Research on the bus service

The holistic approach used in this research has opened several research opportunities related to the design and use of the bus service. Observing each interaction point of the service might offer room for more basic or applied research, e.g. in the stage 'before the journey' more research might be undertaken in terms of what information older people

need in order to use the bus service effectively and with confidence. An additional area that warrants further investigation is related to the drivers' working conditions. More research is needed in terms of how these conditions have an impact on their health and well-being and therefore on their performance as service providers.

A specific follow-up study might be undertaken in order to know how the inclusive service blueprint is being used by the bus service stakeholders in Guadalajara. It would be interesting to know how is being used on the drivers' training programme and measure if there is any effect on the way that drivers perform their activities.

Along with the research opportunities, the need for inclusive bus services offers opportunities for practical intervention. There is still much room for practical work targeting the provision of better bus services. For instance, the results from this research and the inclusive blueprint could be presented to bus service stakeholders in other similar cities in Mexico or in other *developing* countries in order to contribute to designing safe, usable and desirable bus services for older people.

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Appendices

Appendix A

Questionnaire – Focus groups and accompanied journeys

Appendix A - Questionnaire for focus groups and accompanied journeys

Date _____ Time _____ Location _____ Participant Number _____

A. General data

1. Age _____ 2. Gender a) Female b) Male
3. You live with?
a) Alone. b) With a partner. c) With a partner and children. d) Other _____
4. Do you have any problem to get out and about? a) Yes b) No
- 4.1. If it is yes, what kind of problem do you have? _____

B. Socioeconomic and labour status

5. What is your actual labour status?
a) Employee. b) Retired. c) Self-employed. d) Other _____
6. What is your main source of income?
a) Employment. b) Pension. c) Personal business. d) Financial help from relatives. e) Other _____
7. Which of the following ranges is situated your monthly income?
a) Less than \$3500.00
b) \$3501.00 and \$7000.00
c) \$7001.00 and \$10500.00
d) More than \$10500.00

C. Travel habits

8. Please underlines why reasons do you use public transport and tell us how do you travel, how often, what time and method of payment. For which, you can use the guide of below.

Reason to travel	Mean of transport	Frequency	Time to start travelling	Method of payment
Visit friends or family	_____	_____	_____	_____
Medical services	_____	_____	_____	_____
Shopping	_____	_____	_____	_____
Bank	_____	_____	_____	_____
Attending to clubs or associations	_____	_____	_____	_____
Job	_____	_____	_____	_____
School	_____	_____	_____	_____
Other	_____	_____	_____	_____
Other	_____	_____	_____	_____

Mean of transport	Frequency	Time to start traveling	Method of payment
1. Bus	1. Daily	1. before 9.00	1. Cash
2. Light rail	2. 2 or 3 times a week.	2. 9.00-13.00	2. Trasvale
3. Macrobus	3. once a week	3. 13.00-15.00	3. Preferential card
4. Taxi	4. once a fortnight	4. 15.00-17.00	
5. Other:	5. monthly	5. 17.00-19.00	
	6. Other:	6. after 19.00	

Appendix B

Ethics Checklist

Ethical Clearance Checklist

(TO BE COMPLETED FOR **ALL** INVESTIGATIONS INVOLVING HUMAN PARTICIPANTS)

If your research is being conducted off-campus and ethical approval has been granted by an external ethics committee, you may not need to seek full approval from the University Ethical Advisory Committee. However you will be expected to provide evidence of approval and the terms on which this approval has been granted.

If you believe this statement applies to your research, please contact the Secretary of the Ethical Advisory Committee for confirmation.

If your research is transferring into Loughborough University and approval was obtained from your originating institution, there is a requirement on the University to ensure that appropriate approvals are in place.

If you believe this statement applies to your research, please contact the Secretary of the Ethical Advisory Committee with evidence of former approval and the terms on which this approval has been granted.

It is the responsibility of the individual investigators to ensure that there is appropriate insurance cover for their investigation.

If you are at all unsure about whether or not your study is covered, please contact the Finance Office to check.

Section A: Investigators**Title of Investigation**

Improving public transport use by older adults.

First study:

Understanding older people's barriers and needs on public transport in Guadalajara, Mexico

Name, Status and Email Address of Senior Investigators (University Staff Research Grade II and above):

(Please underline responsible investigator where appropriate)

Miss Sharon Cook, Research Fellow. Email: S.E.Cook@lboro.ac.uk

Dr. Andrew May, Research Fellow. Email: A.J.May@lboro.ac.uk

Department: Design School

Name, Status and Email Address of Other Investigators (other University Staff and Students):

Carlos Aceves-Gonzalez, Research Student.

Email: C.Aceves-Gonzalez@lboro.ac.uk

Department: Design School

A1. Do investigators have previous experience of, and/or adequate training in, the methods employed?

Yes ☒ No[†] ☐ [†]If No, Please provide details below

A2. Will junior researchers/students be under the direct supervision of an experienced member of staff?

Yes ☒ No[†] ☐ [†]If No, Please provide details below

A3. Will junior researchers/students be expected to undertake physically invasive procedures (not covered by a generic protocol) during the course of the research?

Yes[†] ☐ No ☒ [†]If Yes, Please provide details below

A4. Are researchers in a position of direct authority with regard to participants (eg academic staff using student participants, sports coaches using his/her athletes in training)?

Yes[†] ☐ No ☒ [†]If Yes, Please provide details below

If you have selected one of the answers above marked with an + please provide additional information on how you intend to manage the issues (please continue onto a separate sheet if required), then submit this checklist to the Secretary to the EAC:

Section B: Participants

Vulnerable Groups

Will participants be knowingly recruited from one or more of the following vulnerable groups?

B1. Children under 18 years of age

Yes[#] ☐ No ☒

(please refer to published guidelines)

B2. People over 65 years of age

Yes[#] ☒ No ☐

B3. Pregnant women

Yes[#] ☐ No ☒

B4. People with mental illness

Yes[#] ☐ No ☒

B5. Prisoners/Detained persons

Yes[#] ☐ No ☒

B6. Other vulnerable group (please specify)

Yes[#] ☐ No ☒

If you have answered 'No' to questions B1-B6, please now go to Section C
 # If the procedure is covered by an existing generic protocol which refers specifically to the vulnerable group(s), please insert reference number here

G04/P4 - Focus groups, Interview and Questionnaires with Vulnerable Groups.

If the procedure is not covered by an existing generic protocol, please submit a full application to the Ethical Advisory Committee

Chaperoning Participants

If appropriate, e.g. studies which involve vulnerable participants, taking physical measures or intrusion of participants' privacy:

B7. Will participants be chaperoned by more than one investigator at all times?

Yes ☐ No* ☐ N/A† ☒ †If N/A, please provide details below

B8. Will at least one investigator of the same sex as the participant(s) be present throughout the investigation?

Yes ☐ No* ☐ N/A† ☒ †If N/A, please provide details below

B9. Will participants be visited at home?

Yes* ☐ No ☒ N/A† ☐ †If N/A, please provide details below

* Please submit a full application to the Ethical Advisory Committee.

If you have selected one of the answers above marked with an † please provide additional information on how you intend to manage the issues

The methods to be employed within the first study and the means for chaperoning are shown below:

Study method	Form of chaperoning
Focus group	Other members of the Focus Group will act as chaperones
Accompanied journeys on public transport	Other bus users will act as chaperones
Meetings with relevant professionals	Meetings will be held at places of work

(please continue onto a separate sheet if required), then submit this checklist to the Secretary to the EAC:

Section C: Methodology/Procedures

To the best of your knowledge, please indicate whether the proposed study:

C1. Involves taking bodily samples

Yes# ☐ No ☒

(please refer to published guidelines)

C2. Involves procedures which are likely to cause physical, psychological, social or emotional distress to participants

Yes# ☐ No ☒

C3. Is designed to be challenging physically or psychologically in any way (includes any study involving physical exercise)

Yes# ☐ No ☒

If the procedure is covered by an existing generic protocol, please insert reference number here

If the procedure is not covered by an existing generic protocol, please submit a full application to the Ethical Advisory Committee

C4. Exposes participants to risks or distress greater than those encountered in their normal lifestyle

Yes* ☐ No ☒

C5. Involves collection of body secretions by invasive methods

Yes* ☐ No ☒

C6. Prescribes intake of compounds additional to daily diet or other dietary manipulation/supplementation

Yes* ☐ No ☒

C7. Involves testing new equipment

Yes* ☐ No ☒

C8. Involves pharmaceutical drugs

Yes* ☐ No ☒

(please refer to published guidelines)

C9. Involves use of radiation

Yes* ☐ No ☒

(please refer to published guidelines). Investigators should contact the University's Radiological Protection Officer before commencing any research which exposes participants to ionising radiation – e.g. x-rays).

C10. Involves use of hazardous materials

Yes* ☐ No ☒

(please refer to published guidelines)

C11. Assists/alters the process of conception in any way

Yes* ☐ No ☒

C12. Involves methods of contraception

Yes* ☐ No ☒

C13. Involves genetic engineering

Yes* ☐ No ☒

* If you have answered 'Yes' to any of the above please submit a full application to the Ethical Advisory Committee

Section D: Observation/Recording

D1. Does the study involve observation and/or recording of participants?

Yes ☒ No ☐

If No, please go to Section E

If Yes,

D2. Will those being observed and/or recorded be informed that the observation and/or recording will take place?

Yes ☒ No* ☐

* Please submit a full application to the Ethical Advisory Committee

Section E: Consent and Deception

E1. Will participants give informed consent freely?

Yes ☒

If **yes** please complete the **Informed Consent** section below.

No* ☐

*If **no**, please submit a full application to the Ethical Advisory Committee.

Note: where it is impractical to gain individual consent from every participant, it is acceptable to allow individual participants to "opt out" rather than "opt in".

Informed Consent

E2. Will participants be fully informed of the objectives of the investigation and all details disclosed (preferably at the start of the study but where this would interfere with the study, at the end)?

Yes ☒

No* ☐

E3. Will participants be fully informed of the use of the data collected (including, where applicable, any intellectual property arising from the research)?

Yes ☒

No* ☐

E4. For children under the age of 18 or participants who have impairment of understanding or communication:

- will consent be obtained (either in writing or by some other means)?

Yes ☐

No* ☐

N/A ☒

- will consent be obtained from parents or other suitable person?

Yes ☐

No* ☐

N/A ☒

- will they be informed that they have the right to withdraw regardless of parental/guardian consent?

Yes ☐

No* ☐

N/A ☒

E5. For investigations conducted in schools, will approval be gained in advance from the Head-teacher and/or the Director of Education of the appropriate Local Education Authority

Yes ☐

No* ☐

N/A ☒

E6. For detained persons, members of the armed forces, employees, students and other persons judged to be under duress, will care be taken over gaining freely informed consent?

Yes ☐

No* ☐

N/A ☒

*** Please submit a full application to the Ethical Advisory Committee**

Deception

E7. Does the study involve deception of participants (ie withholding of information or the misleading of participants) which could potentially harm or exploit participants?

Yes ☐

No ☒ If **No**, please go to Section F

If yes,

E8. Is deception an unavoidable part of the study?

Yes ☐

No* ☐

E9. Will participants be de-briefed and the true object of the research revealed at the earliest stage upon completion of the study? Yes ☐ No* ☐

E10. Has consideration been given on the way that participants will react to the withholding of information or deliberate deception? Yes ☐ No* ☐

*** Please submit a full application to the Ethical Advisory Committee**

Section F: Withdrawal

F1. Will participants be informed of their right to withdraw from the investigation at any time and to require their own data to be destroyed? Yes ☒ No* ☐

*** Please submit a full application to the Ethical Advisory Committee**

Section G: Storage of Data and Confidentiality

Please see University guidance on [Data Collection and Storage](#)

G1. Will all information on participants be treated as confidential and not identifiable unless agreed otherwise in advance, and subject to the requirements of law?

Yes ☒ No* ☐

G2. Will storage of data comply with the Data Protection Act 1998?

(Please refer to [published guidelines](#))

Yes ☒ No* ☐

G3. Will any video/audio recording of participants be kept in a secure place and not released for use by third parties?

Yes ☒ No* ☐

G4. Will video/audio recordings be destroyed within six years of the completion of the investigation?

Yes ☒ No* ☐

G5. Will full details regarding the storage and disposal of any human tissue samples be communicated to the participants?

Yes ☒ No* ☐

*** Please submit a full application to the Ethical Advisory Committee**

Section H: Incentives

H1. Have incentives (other than those contractually agreed, salaries or basic expenses) been offered to the investigator to conduct the investigation?

Yes[†] ☐

No ☒

[†]If Yes, Please provide details below

H2. Will incentives (other than basic expenses) be offered to potential participants as an inducement to participate in the investigation?

Yes[†] ☐

No ☒

[†]If Yes, Please provide details below

If you have selected one of the answers above marked with an † please provide additional information on how you intend to manage the issues (please continue onto a separate sheet if required), then submit this checklist to the Secretary to the EAC:

Section I: Work Outside of the United Kingdom

G1. Is your research being conducted outside of the United Kingdom?

Yes ☒ No ☐

If **Yes**, you may need additional insurance cover/clearance for your research.

If, having completed this checklist, you will be making a full application to the EAC this issue will be checked for you as a part of the process. If however you do not need to complete a full application please contact Hiten Patel (H.Patel@lboro.ac.uk).

Section I: Declarations

Checklist Application only:

If you have completed the checklist to the best of your knowledge without selecting an answer marked with an * or †, your investigation is deemed to conform with the ethical checkpoints and you do not need to seek formal approval from the University's Ethical Advisory Committee. Please sign the declaration below, and lodge the completed checklist with your Head of Department or his/her nominee.

Declaration

I have read the University's Code of Practice on Investigations on Human Participants. I confirm that the above named investigation complies with published codes of conduct, ethical principles and guidelines of professional bodies associated with my research discipline. *Please sign below*

Checklist with additional information to the Committee:

If, upon completion of the checklist you have **ONLY** selected answers which require additional information to be submitted with this checklist (indicated by a †), please ensure that all the information is provided in detail and send this checklist to the Secretary to the EAC.

Full Application Needed:

If on completion of the checklist you have selected one or more answers which require the submission of a full proposal please download the relevant form from the Committee's [web page](#).

A copy of this checklist, signed by your Head of Department should accompany the full submission to the Ethical Advisory Committee.

Signature of Responsible Investigator

.....*S. G. COOK*.....

Signature of Student (if appropriate)

.....*[Signature]*.....

Signature of Head of Department or his/her nominee

.....*Andrew May*.....

Date

5/9/11

Advice to Participants following the investigation

Investigators have a duty of care to participants.

When planning research, investigators should consider what, if any, arrangements are needed to inform participants (or those legally responsible for the participants) of any **health related (or other) problems previously unrecognised in the participant**. This is particularly important if it is believed that by not doing so the **participants well being is endangered**. Investigators should consider whether or not it is appropriate to recommend that participants (or those legally responsible for the participants) seek qualified professional advice, but should not offer this advice personally. Investigators should familiarise themselves with the guidelines of professional bodies associated with their research.

Appendix C

**Addition of the study to the generic protocol number G04/P4, Focus groups,
Interview and Questionnaires with Vulnerable Groups**

Memorandum



To: Committee Secretary, Ethical Advisory Committee

From: Professor Tony Hodgson, Head of Department/ Loughborough Design School.

Subject: Generic Protocol G04/P4 - *Focus groups, Interview and Questionnaires with Vulnerable Groups.*

This memorandum is notification that Carlos Aceves-Gonzalez has been fully trained by Miss Sharon Cook and Dr Andrew May in the methods used in the above Generic Protocol. I would be grateful, therefore, if their name could be added to the list of authorised investigators.

A handwritten signature in blue ink that reads 'Andrew May'.

[signature]

Director Research Degrees Programme,

pp Tony Hodgson, Loughborough Design School

Appendix D

Consent form

Improving public transport use by older adults**INFORMED CONSENT FORM****(to be completed after Participant Information Sheet has been read)**

The purpose and details of this study have been explained to me. I understand that this study is designed to further scientific knowledge and that all procedures have been approved by the Loughborough University Ethical Advisory Committee.

I have read and understood the information sheet and this consent form.

I have had an opportunity to ask questions about my participation.

I understand that I am under no obligation to take part in the study.

I understand that I have the right to withdraw from this study at any stage for any reason, and that I will not be required to explain my reasons for withdrawing.

I understand that all the information I provide will be treated in strict confidence and will be kept anonymous and confidential to the researchers unless (under the statutory obligations of the agencies which the researchers are working with), it is judged that confidentiality will have to be breached for the safety of the participant or others.

I have informed that some pictures will be taken as part of the study and I could be in some of them.

I agree to participate in this study.

Your name

Your signature

Signature of investigator

Date

I would be willing to share more information if necessary, please contact me by:

Email: _____

Phone number: _____

Appendix E

Participant Information Sheet – Focus groups

**Improving public transport use by older adults
Focus groups
Participant Information Sheet**

Carlos Aceves Gonzalez, PhD Student, Loughborough Design School, LE11 4EQ. C.Aceves-Gonzalez@lboro.ac.mx

Miss Sharon Cook, Research Fellow, Loughborough Design School, LE11 4EQ.
S.E.Cook@lboro.ac.uk

Dr. Andrew May, Loughborough Design School, LE11 4EQ.
A.J.May@lboro.ac.uk

What is the purpose of the study?

This study aims identify and prioritize barriers and needs of older people using public transport in Guadalajara, Mexico. As well as detect where opportunities to improve public transport are, taking into account local constraints.

Who is doing this research and why?

This research will be undertaken by Carlos Aceves Gonzalez, under supervision of Miss Sharon Cook and Dr Andrew May. This study is a part of a Student research project funded by Loughborough University and the Mexican Federal Government.

Are there any exclusion criteria?

No, as long as you are well enough to sit in a room with others to discuss.

Once I take part, can I change my mind?

Yes! After you have read this information and asked any questions you may have we will ask you to complete an Informed Consent Form, however if at any time, before, during or after the sessions you wish to withdraw from the study please just contact the main investigator. You can withdraw at any time, for any reason and you will not be asked to explain your reasons for withdrawing.

Will I be required to attend any sessions and where will these be? How long will it take?

Yes, you will be required to attend one session which will last between 1 and 2 hours, and it will be held in the Metropolitan Centre of the Elderly.

Is there anything I need to do before the sessions?

Yes, you will ask to complete a background questionnaire, and sign the informed consent form.

Is there anything I need to bring with me?

No, you do not need to bring anything. Just in case that you use or need glasses, please bring them with you.

Some refreshments will be provided during the session.

What type of clothing should I wear?

There is not a special suggestion; you can come with your ordinary clothes.

What will I be asked to do?

The session will be divided in four parts, to identify:

Firstly, the objectives and procedures of the session will be explained; describing what is expected of you and how this will be obtained.

Secondly, you will need to complete a short questionnaire about your general data and some simple travel questions relating to the types of journeys that you usually do. For this questionnaire you will receive assistance if it is necessary.

Later, as part of a group interview, the researcher will present and explain some cards which contain some issues related with public transport. A set of cards will be given to you and you will receive the next instruction “please, review each issue in the cards and rank them, considering first those that impose greater difficulty using the bus service”.

After, you will have a time to talk and explain your reasons about your first three issues in the ranking. Although, each participant has a turn to speak, you are allowed to talk more and again when other participant says something else.

A short break will be held and refreshments will be offered for you and the other participants. After the break, you will be invited to write some solutions to improve the bus system.

The group discussions will be audio recorded.

What personal information will be required from me?

In this study, we are interested in knowing your age, some characteristics of your health and general information of the way you usually use public transport.

Are there any risks in participating?

There is not any risk in this study.

Will my taking part in this study be kept confidential?

Absolutely, in order to guarantee confidentiality all the information will be kept and analysed without use real names. After it has been analysed, the information will be kept for 5 years and later it will be destroyed.

What will happen to the results of the study?

It is expected that results of this study be used for improving the public transport use by older people in the near future. Equally, it expected results are released through academic and technical reports. However, it is important to do a mention that it will always be kept the anonymous of the data.

What do I get for participating?

I am hoping that you will find the discussion interesting and that you will enjoy the refreshments provided.

I have some more questions who should I contact?

You should contact to the manager of the day centre, who knows all details about this research.

What if I am not happy with how the research was conducted?

In that case, you have some options;

Firstly, you can tell me what you found not good and we can discuss about it. Another alternative, it is talking with the manager of the day centre. Other could be contacting to Miss Sharon Cook or Dr Andrew May, or you can make direct contact with The Loughborough University, that has a policy relating to Research Misconduct and Whistle Blowing which is available online and you can find in the next link:

[http://www.lboro.ac.uk/admin/committees/ethical/Whistleblowing\(2\).htm](http://www.lboro.ac.uk/admin/committees/ethical/Whistleblowing(2).htm).

Thanks in advance for your participation!!

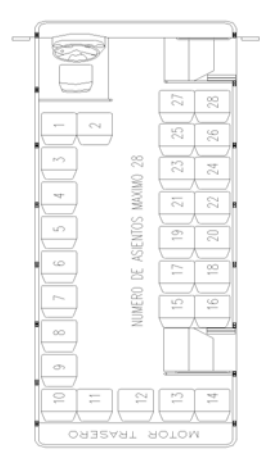
Appendix F

Data collection Sheet – Journeys observations

Location _____ Time _____
 Bus type _____ Date _____ Trip No. _____
 Observer _____ Passenger number _____

Getting on and moving to seat

Time _____
 Use concession _____ Seat Locator _____
 Drive off to early _____
 Use hand rails _____
 Balance loses _____
 Travel alone _____
 Use any mobility Aid _____
 Did he need any help? _____
 Travel with bags _____
 Available priority seats _____
 Seats taken by young people _____



Notes

Traveling

Getting off

Balance loses _____ Time _____

General

Unstable trip _____ Crowded bus _____
 Friendly driver _____ Any time driver did not stop? _____
 Amount of older people _____ / _____

Appendix G

Participant Information Sheet – Accompanied journeys

**Improving public transport use by older adults
Accompanied journeys
Participant Information Sheet**

Carlos Aceves Gonzalez, PhD Student, Loughborough Design School, LE11 4EQ. C.Aceves-Gonzalez@lboro.ac.mx

Miss Sharon Cook, Research Fellow, Loughborough Design School, LE11 4EQ.
S.E.Cook@lboro.ac.uk

Dr. Andrew May, Loughborough Design School, LE11 4EQ.
A.J.May@lboro.ac.uk

What is the purpose of the study?

This study aims identify barriers and needs of older people using public transport in Guadalajara, Mexico. As well as detect where opportunities to improve public transport are, taking into account local constraints.

Who is doing this research and why?

This research will be undertaken by Carlos Aceves Gonzalez, under supervision of Miss Sharon Cook and Dr Andrew May. This study is a part of a Student research project funded by Loughborough University and the Mexican Federal Government.

Are there any exclusion criteria?

No, as long as you have some health or mobility problems to travel by buses and are a bus user.

Once I take part, can I change my mind?

Yes! After you have read this information and asked any questions you may have we will ask you to complete an Informed Consent Form, however if at any time, before, during or after the sessions you wish to withdraw from the study please just contact the main investigator. You can withdraw at any time, for any reason and you will not be asked to explain your reasons for withdrawing.

Will I be required to attend any sessions and where will these be? How long will it take?

Yes – the session will comprise an interview which will start in your address and will be conducted while we are using the bus service in your city. The interview will last around 30-45 minutes and it will be finished when we arrive to the destination of the trip.

Is there anything I need to do before the interview?

Yes, you will ask to complete a background questionnaire, and sign the informed consent form.

Is there anything I need to bring with me?

No, you do not need to bring anything. Just in case that you use or need glasses, please bring them with you.

What type of clothing should I wear?

There is not a special suggestion; you can come wearing clothes that you would normally wear when travelling on the bus.

What will I be asked to do?

Your participation will be divided in three parts, to identify:

Firstly, the objectives and procedures of the interview will be explained; describing what is expected of you and how this will be obtained.

Secondly, you will need to complete a short questionnaire about your general data and some simple travel questions relating to the types of journeys that you usually do. For this questionnaire you will receive assistance if it is necessary.

Later, we will start the interview and you will be asked to reply the question statement “Tell me about your experience in this stage” To answer you will tell me your experience. After that, there will be other questions about “what are your biggest problems in that stage?” and “what goes well?” The interview will be audio recorded and will cover the stages in a whole journey, from your address to your destination. I may also make notes on my own observations of the journey.

Finally, as a part of the interview we will ask you about possible solutions that you think could be implemented in order to improve the bus service.

What personal information will be required from me?

In this study, we are interested in knowing your age, some characteristics of your health and general information of the way you usually use public transport.

Are there any risks in participating?

There is not anticipated to be any additional risk to that which you would normally encounter when you used a bus. However if you are not happy with any aspect of this process, please let me know.

Will my taking part in this study be kept confidential?

Absolutely, in order to guarantee confidentiality all the information will be kept and analysed without use real names. After it has been analysed, the information will be kept for 5 years and later it will be destroyed.

What will happen to the results of the study?

It is expected that results of this study be used for improving the public transport use by older people in the near future. Equally, it expected results are released through academic papers, technical reports, presentations and websites. However, it is important to do a mention that it will always be kept the anonymous of the data.

What do I get for participating?

I am hoping that you will find the discussion interesting and that you will enjoy the refreshments provided.

I have some more questions who should I contact?

You should contact to the manager of the day centre, who knows all details about this research.

What if I am not happy with how the research was conducted?

In that case, you have some options;

Firstly, you can tell me what you found not good and we can discuss about it. Another alternative, it is talking with the manager of the day centre. Other could be contacting to Miss Sharon Cook or Dr Andrew May, or you can make direct contact with The Loughborough University, that has a policy relating to Research Misconduct and Whistle Blowing which is available online and you can find in the next link:

[http://www.lboro.ac.uk/admin/committees/ethical/Whistleblowing\(2\).htm](http://www.lboro.ac.uk/admin/committees/ethical/Whistleblowing(2).htm).

Thanks in advance for your participation!!

Appendix H

Prompt cards – Accompanied journeys

Prompt cards - Accompanied journeys

Before trip <ul style="list-style-type: none">- Choosing destination- Choosing type of transport- Consult information (timetables, maps,etc)	Walk to the bus stop <ul style="list-style-type: none">- Walking to bus stop- Crossing roads- Identify bus stop and station- Access to the bus stops- Waiting for the bus
Getting on the bus <ul style="list-style-type: none">- Identify correct incoming vehicle- Being detected by driver- Getting on the bus- Hold the handrail- Paying to driver and receive ticket- Identify and move to a seat	During the trip <ul style="list-style-type: none">- Maintaining seating position- Balance if standing- Identify arrival point- Identify visual displays
Getting off <ul style="list-style-type: none">- Standing up- Reach stop button on the bus- Reach the exit door- Getting off	Walking to the destination <ul style="list-style-type: none">- Walking to your destination

Appendix I

Data collection sheet – Accompanied journeys

Data collection sheet for accompanied journeys

Date	Number of participant	Location
Start time:	End time:	

1. Before the trip

2. Walking to the bus stop

3. Waiting for the bus

4. Boarding

5. Travelling

6. Alighting

7. Walking to destination

8. General observations

Appendix J

Presentation of the inclusive service approach – stakeholders' workshops

Improving the bus service through the application of inclusive service design approach

Carlos Aceves Gonzalez
PhD Student

Sharon Cook
Andrew May
Supervisors



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Aim

- To improve the bus service in Guadalajara, Mexico through applying the inclusive service design approach



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Objectives

- To present the inclusive service design approach as an alternative in improving the bus service.
- To describe the methodology used as part of the research project
- To show the results of empirical studies
- To present the inclusive service blueprint
- To evaluate the usefulness of approach and blueprint



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Background

- The need of an inclusive bus service



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Approach

Inclusive Design

- “design of mainstream products and/or services that are accessible to, and usable by, people with the widest range of abilities within the widest range of situations without the need for special adaptation or design” (The British Standards Institute, 2005)
- ‘It is a general approach to designing in which designers ensure that their products and services address the needs of the widest possible audience, irrespective of age or ability’ (Design Council, 2008).

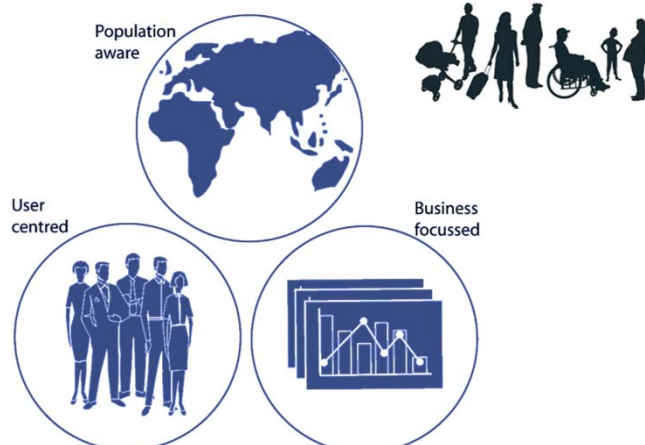
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Approach

Ethos of inclusive design



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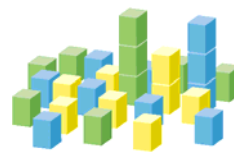
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Service Design

Approach

- It aims to innovate or improve services that are useful, usable and desirable from the user perspective, and efficient, effective and different from the organisations perspective (Mager & Sung, 2011)



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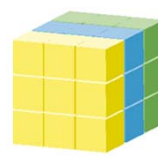
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Service Design - Principles

Approach

- Human – centred
- Co-creative
- Evidencing
- Sequencing
- Holistic

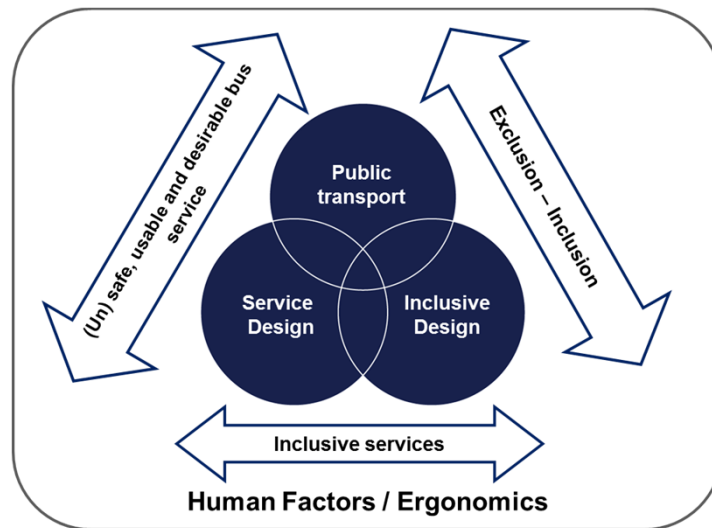


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Inclusive service approach



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Who are the users?



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Methods

Mixed methods approach

- Focus groups
- Journey observations
- Accompanied Journeys
- Stakeholders interviews



Focus groups – Users' perception

Objectives

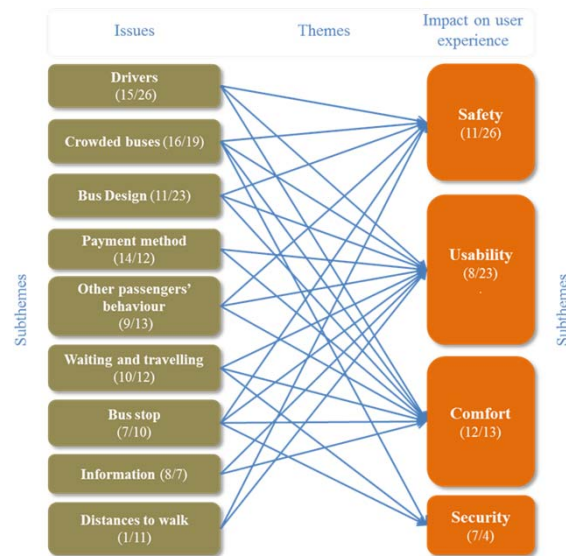
- Identify problematic issues
- Prioritise these issues
- Identify the impact of these issues on the user experience

Participants

- Younger people
- Older people

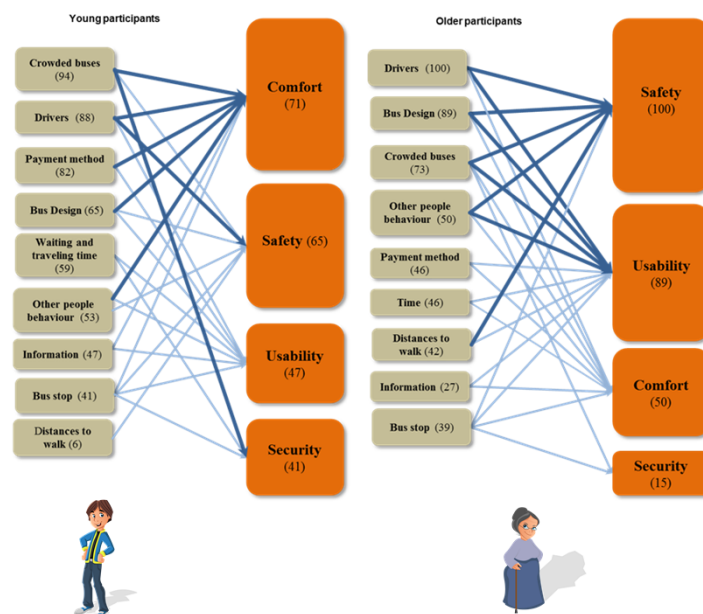


Results



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Journeys observation - Passengers' behaviour

Objectives

- To investigate the relationship between the bus service characteristics and the behaviour differences among young and older passengers



Participants and stages

- 333 observed passengers (189 younger and 144 older passengers)
- From boarding to alighting from the bus

Results

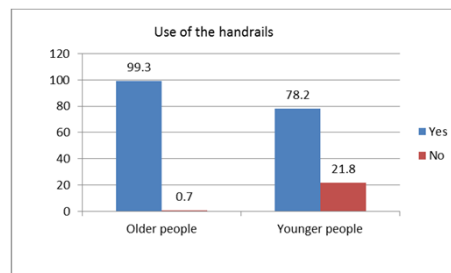
Bus service characteristics

- Crowded buses
- Passenger instability
- Driving style and drivers' behaviour
- Bus design

Results

Observed differences

- Climbing steps and handrails use



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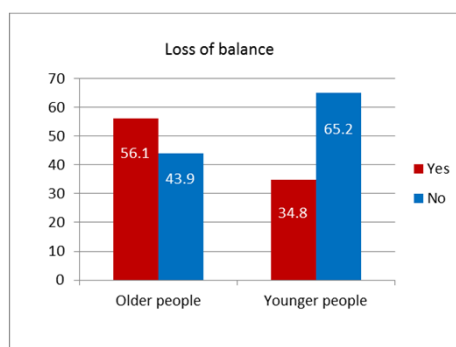
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Observación directa

Results

Observed differences



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Accompanied journeys — Perception and behaviour

Objectives

- To ascertain the main barriers that older people face in each touch-point of a door-to-door journey

Participants

- 12 older people

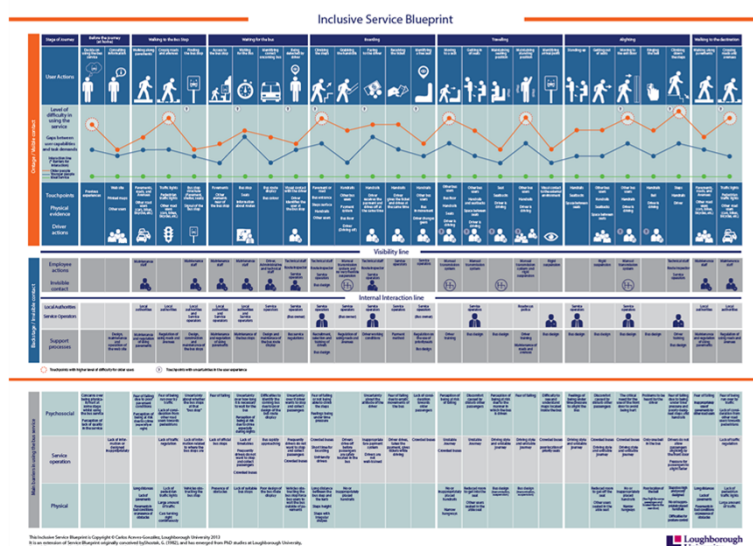


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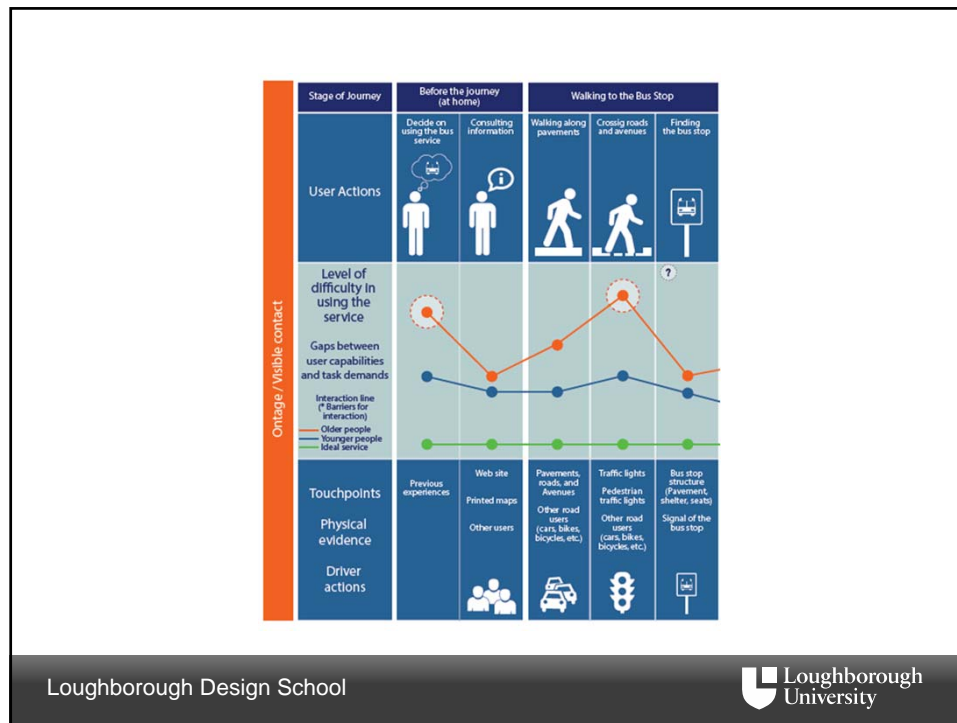
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Blueprint presentation



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- Assessment of approach and blueprint

Questionnaires and feedback

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Appendix K

Questionnaire 1 – Assessing the inclusive service design approach

Questionnaire 1:

Assessing the use of inclusive service design approach

Participant information

No.

Gender M F

Organisation: _____

Date

Position: _____

A. Please write down what do you think the issues of the bus service are for older passengers?

•

•

•

1. Assessment of the use of inclusive service design approach

1.1. Based on your impression of the inclusive service design approach, to what extent do you agree to the follow sentences?

	Strongly disagree	Disagree	Slightly disagree	Neither agree or disagree	Slightly agree	Agree	Strongly agree
This approach is very useful for improving the bus service							
The use of this approach can help to satisfy the needs of more users							
The approach provides several benefits for the different users							
The approach provides several benefits for the service providers							
The use of this approach for improving the service might increase the uptake of the service							

The value of designing for a more inclusive bus service

1.2. Indicate to what extent you personally agree with following statement.

	Strongly disagree	Disagree	Slightly disagree	Neither agree or disagree	Slightly agree	Agree	Strongly agree
In this session, I have gained a better understanding of the value of designing for a more inclusive bus service							

Increasing understanding on users' differences, experience, and needs

1.3. Please indicate to what extent you agree with the following statements:

My understanding has increased regarding to:

	Strongly disagree	Disagree	Slightly disagree	Neither agree or disagree	Slightly agree	Agree	Strongly agree
the difference among users							
the characteristics, experience, and needs of the younger people using the service							
the characteristics, experience, and needs of the older people using the service							

Understanding on the key issues that are critical in meeting the needs of users

1.4. To what extent you agree that you have increased your understanding related to how the following issues impose difficulties to use the service?							
	Strongly disagree	Disagree	Slightly disagree	Neither agree or disagree	Slightly agree	Agree	Strongly agree
The bus design							
The driving style and drivers' behaviour							
Crowded buses							
Other people behaviour							
Payment method							
Waiting and traveling time							
Distances to walk							
Lack of information							
Bus stops							

Understanding how the bus service have a different impact on passengers' experience

1.5. Indicate to what extent you agree with following statements.							
	Strongly disagree	Disagree	Slightly disagree	Neither agree or disagree	Slightly agree	Agree	Strongly agree
Now, I have a better understanding of how the bus service affects the younger users experience							
Now, I have a better understanding of how the bus service affects the older users experience							

Underlining learning

1.6. What new information have you learnt regarding the issues in bus use by older people?							
•							
•							
•							

Understanding the relevance of considering all the elements of the bus service

1.7. Indicate to what extent you agree with following statements.							
	Strongly disagree	Disagree	Slightly disagree	Neither agree or disagree	Slightly agree	Agree	Strongly agree
Now, I have increased understanding of the all elements relevant to a bus journey							
Now, I have increased understanding of the critical role played by backstage and support processes to provide a better service							

Usefulness to provide a common platform for the discussion of the service improvement

1.8. In your personal opinion, how useful is this approach in providing a common platform for everyone to participate in the discussion of the service improvement?							
	Not useful 1	2	3	4	5	6	Very useful 7

Usefulness to generate ideas and identify opportunities for improving the service

1.9. In your personal opinion, how useful is this approach in allowing the generation of ideas and the identification of opportunities for improving the bus service?							
	Not useful 1	2	3	4	5	6	Very useful 7

Appendix L

Questionnaire 2 – Assessing the inclusive service blueprint

Questionnaire 2:

Number _____

Assessing the use of inclusive service blueprint

2. Assessment of the use of inclusive service blueprinting

2.1. Based on your impression of the service blueprinting tool, to what extent do you agree to the follow sentences?							
	Strongly disagree	Disagree	Slightly disagree	Neither agree or disagree	Slightly agree	Agree	Strongly agree
The use of this tool in this session helped me to get a better understanding of the inclusive service approach							
The tool is easy to use and understand							
The tool provides accurate information about users							
The tool provides accurate information of the bus service							

Usefulness to visualise and communicate

2.2. Based on your impression of the inclusive service blueprinting, on a scale from 1 to 7 please indicate how useful is this tool to visualise and communicate the following issues							
	Not useful 1	2	3	4	5	6	Very useful 7
The differences among users							
The characteristics and needs of each group of users							
The critical points of the bus service that impose difficulties and have an impact on the user's experience							
All the elements of the bus service							

Usefulness to provide a common platform for the discussion of the service improvement

2.3. In your personal opinion, how useful is this tool in providing a common platform for everyone to participate in the discussion of the service improvement?

	Not useful 1	2	3	4	5	6	Very useful 7

Usefulness to generate ideas and identify opportunities for improving the service

2.4. In your personal opinion, how useful is this tool in allowing the generation of ideas and the identification of opportunities for improving the bus service?

	Not useful 1	2	3	4	5	6	Very useful 7

Assessment of the future use of the tool

2.5. Based on your impression of the inclusive service blueprint would you consider using it for future service improvement?

	Not, definitely 1	2	3	4	5	6	Yes, definitely 7

How the tool can be used?

2.6. If your answer was perhaps or yes, how do you think you could use it?

-
-

How the tool can be improved?

2.7. Finally, How do you think it can be improved?

-
-

Appendix M

Variables and codes for statistical analysis – Chapter 9

Variables and codes for statistical analysis – Chapter 9

Questionnaire section	Label	Variable name	Values	Measure
Questionnaire 1				
A	Stakeholder	Particetype	1 = Bus Manufacturers 2 = Bus Operators 3 = Local Authorities in Transport 4 = Local Authorities in Ageing 5 = NGOs 6 = Drivers 7 = Design Students	Nominal
A	Gender	Gender	0 = Female 1 = Male	Nominal
1.1	Rating	Q1_1a Q1_1b Q1_1c Q1_1d Q1_1e	1 = Strongly disagree 2 = Disagree 3 = Slightly disagree 4 = Neutral 5 = Slightly agree 6 = Agree 7 = Strongly agree	Ordinal
1.2		Q1_2a		
1.3		Q1_3a Q1_3b Q1_3c		
1.4		Q1_4a Q1_4b Q1_4c Q1_4d Q1_4e Q1_4f Q1_4g Q1_4h Q1_4i		
1.5		Q1_5a Q1_5b Q1_7a Q1_7b		
1.7				
1.8		Q1_8		
1.9		Q1_9		
Questionnaire 2				
2.1	Rating	Q2_1a	1 = Strongly disagree	Ordinal

2.2		Q2_1b Q2_1c Q2_1d Q2_2a Q2_2b Q2_2c Q2_2d	2 = Disagree 3 = Slightly disagree 4 = Neutral 5 = Slightly agree 6 = Agree 7 = Strongly agree	
2.3		Q2_3	1 = Not useful 2 = 2	
2.4	Rating	Q2_4	3 = 3 4 = 4 5 = 5 6 = 6 7 = Very useful	Ordinal
2.5	Rating	Q2_5	1 = Not, definitely 2 = 2 3 = 3 4 = 4 5 = 5 6 = 6 7 = Yes, definitely	Ordinal

Appendix N

SPSS syntax code for questionnaire analysis – Chapter 9

* Variables Labels

* This procedure allows using numerical or textual value levels.

VARIABLE LABELS ParticType
'Stakeholder' .

VALUE LABELS ParticType

1 'Bus Manufactures'

2 'Bus Operators'

3 'Local Authorities in Transport'

4 'Local Authorities in Ageing'

5 'NGOs'

6 'Drivers'

7 'Design Students'.

VALUE LABELS ParticType

1 '1'

2 '2'

3 '3'

4 '4'

5 '5'

6 '6'

7 '7'.

VALUE LABELS Q1_1a Q1_1b
Q1_1c Q1_1d Q1_1e Q1_2a Q1_3a
Q1_3b Q1_3c Q1_4a Q1_4b Q1_4c

Q1_4d Q1_4e Q1_4f Q1_4g Q1_4h
Q1_4i Q1_5a Q1_5b Q1_7a Q1_7b
Q2_1a Q2_1b Q2_1c Q2_1d

1 'Strongly disagree'

2 'Disagree'

3 'Slightly disagree'

4 'Neutral'

5 'Slightly agree'

6 'Agree'

7 'Strongly agree'.

VALUE LABELS Q1_8 Q1_9 Q2_2a
Q2_2b Q2_2c Q2_2d Q2_3 Q2_4
Q2_5

1 'Not useful'

2 '2'

3 '3'

4 '4'

5 '5'

6 '6'

7 'Very useful'.

VALUE LABELS Q2_5

1 'Not, definitely'

2 '2'

3 '3'

4 '4'

5 '5'

6 '6'

7 'Yes, definitely'.

VALUE LABELS Q1_1a Q1_1b
Q1_1c Q1_1d Q1_1e Q1_2a Q1_3a
Q1_3b Q1_3c Q1_4a Q1_4b Q1_4c

Q1_4d Q1_4e Q1_4f Q1_4g
Q1_4h Q1_4i Q1_5a Q1_5b Q1_7a
Q1_7b Q1_8 Q1_9 Q2_1a Q2_1b
Q2_1c Q2_1d Q2_2a

Q2_2b Q2_2c Q2_2d Q2_3 Q2_4
Q2_5

1 '1'

2 '2'

3 '3'

4 '4'

5 '5'

6 '6'

7 '7'.

* Descriptives.

* Descriptives were run to observe
the mean of each variable with all
stakeholders.

FREQUENCIES

VARIABLES=Q1_1a Q1_1b Q1_1c
Q1_1d Q1_1e Q1_2a Q1_3a Q1_3b
Q1_3c Q1_4a Q1_4b Q1_4c

Q1_4d Q1_4e Q1_4f Q1_4g
Q1_4h Q1_4i Q1_5a Q1_5b Q1_7a
Q1_7b Q1_8 Q1_9 Q2_1a Q2_1b
Q2_1c Q2_1d Q2_2a

Q2_2b Q2_2c Q2_2d Q2_3 Q2_4
Q2_5

/STATISTICS=MINIMUM
MAXIMUM MEAN MEDIAN

/BARCHART FREQ

/ORDER=ANALYSIS.

* Chart Builder.

* Stakeholder by Gender_This graph
comprised the frequency of
stakeholders stacked by gender.

DATASET ACTIVATE DataSet1.

GRAPH

/BAR(STACK)=COUNT BY
ParticType BY Gender.

* Boxplot By Stakeholder.

* These graphs show the rating
towards approach and blueprint by
each stakeholder.

EXAMINE VARIABLES=Q1_1a
Q1_1b Q1_1c Q1_1d Q1_1e Q1_2a
Q1_3a Q1_3b Q1_3c Q1_4a Q1_4b
Q1_4c

Q1_4d Q1_4e Q1_4f Q1_4g
Q1_4h Q1_4i Q1_5a Q1_5b Q1_7a
Q1_7b Q1_8 Q1_9 Q2_1a Q2_1b
Q2_1c Q2_1d Q2_2a

Q2_2b Q2_2c Q2_2d Q2_3 Q2_4
Q2_5 BY ParticType

/PLOT=BOXPLOT

/STATISTICS=NONE

/NOTOTAL.

* Statistics.

* Kruskal Wallis test was used to explore significant differences in ordinal variables.

* Q1_1d, Q1_4g, and Q1_5a are significant.

NPAR TESTS

/K-W=Q1_1a Q1_1b Q1_1c Q1_1d
Q1_1e Q1_2a Q1_3a Q1_3b Q1_3c
Q1_4a Q1_4b Q1_4c Q1_4d Q1_4e
Q1_4f

Q1_4g Q1_4h Q1_4i Q1_5a
Q1_5b Q1_7a Q1_7b Q1_8 Q1_9
Q2_1a Q2_1b Q2_1c Q2_1d Q2_2a
Q2_2b Q2_2c Q2_2d

Q2_3 Q2_4 Q2_5 BY
ParticType(1 7)

/MISSING ANALYSIS.

MEANS

TABLES=Q1_1a Q1_1b Q1_1c
Q1_1d Q1_1e Q1_2a Q1_3a Q1_3b
Q1_3c Q1_4a Q1_4b Q1_4c Q1_4d
Q1_4e Q1_4f

Q1_4g Q1_4h Q1_4i Q1_5a
Q1_5b Q1_7a Q1_7b Q1_8 Q1_9
Q2_1a Q2_1b Q2_1c Q2_1d Q2_2a
Q2_2b Q2_2c Q2_2d

Q2_3 Q2_4 Q2_5 by ParticType

/CELLS COUNT MEDIAN .

Appendix O

Evidence from the press conference in Guadalajara, Mexico

A. Photos from the press conference



B. Links to the news on the radio

<http://www.notisistema.com/noticias/transporte-publico-sufrimiento-para-el-adulto-mayor-revela-estudio/>

<http://www.notisistema.com/noticias/sugieren-eliminar-escalones-en-transporte-publico/>

C. Newspapers (online and printed)

La JORNADA

MARTES 2 DE DICIEMBRE DE 2013 • POLÍTICA 9

■ **En enero se iniciará el Registro Estatal de Movilidad, anunció Mauricio Gudiño**

■ **En enero se iniciará el Registro Estatal de Movilidad, anunció Mauricio Gudiño**

Convoca Movilidad a transportistas a registrarse para crear rutas-empresa

■ **Concesionarios entregarán su permiso individual y a cambio se les integrará en una ruta-corredor**

La Secretaría de Movilidad (Semov) lanzó la convocatoria en el periódico oficial *El Estado de Jalisco*, dirigida a transportistas que estén interesados en asociarse en rutas-empresa en la zona metropolitana de Guadalajara.

Con ello se da un primer paso en el nuevo modelo de transporte que quiere implantar el gobierno estatal, aseguró el secretario Mauricio Gudiño, quien dijo que el Registro Estatal de Movilidad, comenzará a operar el 1 de enero.

"Sacamos una convocatoria para todos los transportistas en dos aspectos: primero, a quienes desean participar en las rutas de concesiones directas, los estamos invitando a que se registren desde el 1 de enero de acuerdo a como lo establece la ley, en el Registro Estatal de Movilidad y también los estamos a que asistan para plantear de los detalles y vayan recorriendo o apoyando las nuevas unidades del transporte público", dijo el funcionario estatal.

La nueva Ley de Movilidad del estado permite el establecimiento de rutas-empresa o rutas-corredor, modelo en el que los dueños de unidades entregan su permiso individual y a cambio la autoridad los integra en una ruta-corredor, junto con otros transportistas. La concesión por ruta tendrá una vigencia de 10 años, cuando antes sólo era por espacio de seis años, el lapso de gobierno del Poder Ejecutivo. Con el periodo de 10 años se quiere dar garantías a los concesionarios a que recuperen su inversión, ya que deben adquirir camiones nuevos para dar el servicio con especificaciones técnicas fijadas por la Semov.

"¿Cuándo se definirá las primeras rutas-corredor?, se le presentará al funcionario estatal."

En el caso del Distrito Federal lograron en seis años renovar 10% de las rutas y el parque vehicular. Estamos operando bastante más rápido. La invitación es abierta a todos. Les vamos a dar toda la asesoría técnica sobre cómo constituir las asociaciones o como establecerse como personas jurídicas y asociarlos en las concesiones de ruta directa.

¿Cuál es el plazo para que se entregue el parque vehicular de transporte público?

Actualmente hay ocho mil 500 unidades en Jalisco, de las cuales cinco mil 300 dan servicio en la zona metropolitana. Serán hasta 10 años de uso de los camiones, pero en concesiones de ruta directa, sólo podrán participar unidades nuevas.

Agregó que hasta el mes de enero próximo van a tener información de dónde se harán los corredores. Dijo que el Registro Estatal será un tema clave para todo el transporte público. Todos los transportistas de todas las modalidades tendrán que estar inscritos en el Registro y eso se hará a partir de enero.

Por ello, el primer paso es constituir el Registro Estatal de Mo-

vilidad y el segundo será hacer la definición de las rutas-corredor.

"Va a funcionar de la siguiente manera: se saca un concurso de un corredor y todos los que par-

ticipan en ese corredor tendrán que participar en esa ruta directa de concesión, si no participan, tendrán que participar como rutas alimentadoras o cambiarlas

a otro lado", expresó Gudiño. Hoy, la Semov dará una conferencia de prensa para dar más detalles sobre la convocatoria a los concesionarios.

■ **Piden cambios para reducir riesgos para adultos mayores en transporte**

Con base en el estudio de un especialista en ergonomía, el Instituto Jaliscoense del Adulto Mayor (IJAM) pidió a la Semov que se emita una nueva norma técnica para las unidades del transporte público, ya que el diseño de las unidades son inseguras para las personas de la tercera edad, dijo el titular del organismo, Luis Cisneros Quirón.

Según el estudio hecho por Carlos Aceves González, integrante del Centro de Investigaciones en Ergonomía de la UdeG, con el respaldo de la Universidad de Loughborough, Inglaterra, al abordar un camión o un autobús del transporte público representa una serie de riesgos de sufrir un accidente. El peor momento es cuando las personas mayores de 65 años bajan por las escaleras altas y con la presión del conductor porque lo hagan en forma rápida, lo que algunas veces ocasiona caídas, algunas de ellas mortales.

Por su parte, Cisneros Quirón dijo que en el estudio se acompañó al adulto mayor desde el momento que dejó su casa, camina a la parada del camión y lo espera, sube a la unidad, vive en ella, baja del camión y camina a su destino. Son en total siete etapas del viaje y a cada una corresponde un nivel de dificultad específico.

El adulto mayor para tomar el camión debe cruzar calles y manejar con el temor a ser atropellado, en una cultura de falta de consideración al peatón. "Debe subir al camión por escaleras muy altas que no le permiten bajar, con miedo a caer y no poder subir, con la sensación de estar bajo la presión del tiempo y en muchos casos con un chofer que no se detiene cerca de la banqueta".

Aceves González, dijo que el diseño de las unidades debe estar a la más cerca posible de las necesidades de un adulto mayor y por ende de cualquier persona. Una de las opciones es otorgar el uso de camiones de piso bajo.

Por su parte, el diputado del PRI, Martín López Cedillo, presidente de la Comisión de Vialidad y Transporte

del Congreso, se comprometió a revisar el estudio y a tomar decisiones para adecuar las normas respectivas y así contar con unidades de transporte más seguras.

En entrevista posterior, el titular de la Secretaría de Movilidad, Mauricio Gudiño Cisneros, reconoció que por el momento no se puede establecer un diseño de camiones con piso bajo, dado el costo alto de ese tipo de unidades. No obstante, dijo que tomará en cuenta el estudio para atender las necesidades de los adultos mayores.

Según el estudio dado a conocer, 25% de los víctimas de accidentes viales en Jalisco, pertenecen al sector poblacional de los adultos mayores, cuando ese grupo representa apenas 1% del total de la población jaliscoense. Entre enero y octubre del presente año, el Instituto Jaliscoense de Ciencias Forenses reportó que fallecieron mil 17 personas en accidentes viales. De ellos, 253 personas eran mayores de 65 años.

KARLO PÉREZ VELA

■ **Quito Prensa**

■ **Aumentan la credibilidad de las instituciones públicas, dicen**

Urgen expertos a aplicar esquemas de presupuesto participativo en Jalisco

El alcalde de Guadalajara, Ramiro Hernández, visita a familias de policías ayer durante la inauguración de la Semana de Seguridad. ■ Foto: La Jornada Jalisco

Porque reduce la distancia entre las instituciones públicas y aumenta la credibilidad de las mismas, es necesario que en Jalisco se registren los esquemas de presupuesto participativo, considerando diversos actores de la administración pública local emanados de diversos partidos políticos.

El presupuesto participativo, un esquema de democracia directa en el que los ciudadanos deciden en qué se invertirá un determinado porcentaje de los recursos públicos, surgió a finales de la década de los 80 en Porto Alegre, Brasil por impulso del Partido de los Trabajadores y, desde entonces, a nivel mundial, se ha presentado, al menos, seis mil iniciativas buscando replicar el modelo, en que en Jalisco se haya logrado consolidar alguna en ese sentido.

Durante la presentación del libro *Presupuesto participativo, una herramienta para la democracia*, compilación coordinada por el registro preta del ayuntamiento de Guadalajara, Carlos Brarero, y editado por el Instituto Electoral y de Participación Ciudadana (IEPC), el alcalde agareño, Ramiro Hernández García, indicó que la democracia "supone que la participación de los ciudadanos no está limitada a la elección de representantes".

A pesar de que en la capital del estado no existe una legislación que garantice la aplicación de este esquema, el presidente municipal resaltó la implementación del proyecto del Presupuesto Participativo Infantil y Juvenil, que se desarrolló entre el 26 y el 28 de

noviembre pasados y cuyos resultados —que no son vinculantes— se darán a conocer en la segunda quincena de este mes. Aseveró que

son 10 millones de pesos los que se contempló aplicar en las obras que decidan los estudiantes de primaria y secundaria del municipio.

Por su parte, la diputada de Movimiento Ciudadano (MC), Verónica Delgadillo, indicó que en el Congreso del Estado ya se discute una Ley de Participación Ciudadana que, entre 12 formas de participación, estipula la obligatoriedad de aplicar anualmente un esquema de presupuesto que involucre a los ciudadanos.

En tanto, el diputado panista Guillermo Guerrero Torres, mencionó que existe un distanciamiento entre las instituciones gubernamentales y la sociedad civil organizada que ha repercutido en que las figuras de participación ciudadana existentes en la legislación jaliscoense —el plebiscito, el referéndum y la iniciativa popular— no hayan logrado un sentimiento de apropiación entre la ciudadanía.

El legislador panista, Enrique Velázquez, destacó la relación existente entre la confianza de los ciudadanos en la democracia y esquemas efectivos de participación ciudadana, algo relevante en un momento en que diversos observadores ciudadanos han criticado que los mexicanos están dispuestos a sacrificar parte de los derechos políticos inherentes al sistema democrático a favor de una desastrosa economía.

Internet Explorer - Piden camiones dis... x

MOMENTOS DE BIENESTAR


La Jornada Jalisco Viernes, Septiembre 12, 2014
 Buscar en el sitio...

Inicio	Política	Jalisco	Nacional	Internacional	Cultura	Deportes	Opinión	Patricio Monero
Últimas	17:20	La defensa del Veracruz será un reto complicado para Atlas, dice Enrique Pérez ...	16:18	De Nigris jugará frente a Monterrey; será operado hasta el domingo ...	15:49	Seguridad y empleo, faltantes en el segundo informe de Ramiro: Oposición ...	15:43	Chofer frustra asalto en ruta 641 ...

Piden camiones diseñados para evitar accidentes en adultos mayores

2 de diciembre, 2013 | Categoría: Jalisco, portadas | Escrito por: Ignacio Pérez Vega

• Se presentó un estudio de ergonomía con el respaldo de la Universidad de Loughborough, Inglaterra



Mauricio Godíño Coronado, secretario de Movilidad. Foto: Ignacio Pérez Vega

Por: Ignacio Pérez Vega


2 de diciembre 2013.- Con base en un estudio hecho por el especialista en ergonomía, **Carlos Aceves González**, el Instituto Jalisciense del Adulto Mayor (IJAM) planteó a la Secretaría de Movilidad que se emita una nueva norma técnica para las unidades del transporte público, ya que el diseño de las actuales son **inseguras para las personas de la tercera edad**, dijo el titular del organismo, **Luis Cisneros Quirarte**.

Según el estudio hecho por Carlos Aceves González, integrante del Centro de Investigaciones en Ergonomía de la Universidad de Guadalajara (UdeG), con el respaldo de la Universidad de Loughborough, Inglaterra, abordar un camión o un minibus del transporte público representa una serie de riesgos de sufrir un accidente.


El peor momento es cuando las **personas mayores de 65 años de edad bajan por los escalones altos y con la presión del conductor porque lo haga en forma rápida**, lo que algunas veces ocasiona caídas, algunas de ellas mortales.

RAYUELA


Responsabilidad y cordura, ¿existe eso en la política?



Nuestra edición de hoy



Open publication - Free publishing



<http://www.lajornadajalisco.com.mx/2013/12/02/piden-camiones-diseñados-para-evitar-accidentes-en-adultos-mayores/>

ayores-en-transporte/ Piden camiones diseña... Piden cambios para ...

La Jornada Jalisco Viernes, Septiembre 12, 2014
 Buscar en el sitio...

Inicio	Política	Jalisco	Nacional	Internacional	Cultura	Deportes	Opinión	Patricio Mone
Últimas	14:45 El fraccionamiento Puerta de Hierro... Intocable ...	12:21 A 41 años del Golpe de Estado contra Salvador Allende ...	11:11 Firmas al Senado ...	08:00 The Oat ponerle baile ...				

Piden cambios para reducir riesgos para adultos mayores en transporte

3 diciembre, 2013 | Categoría: Política | Escrito por: Edición Impresa

Con base en el estudio de un especialista en ergonomía, el Instituto Jalisciense del Adulto Mayor (IJAM) planteó a la Semov que se emita

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Por su parte, Cisneros Quirarte dijo que en el estudio se acompañó al adulto mayor desde el momento que deja su casa, camina a la parada del camión y lo espera, sube a la unidad, viaja en ella, baja del camión y camina a su destino. Son en total siete etapas del viaje y a cada una corresponde un nivel de dificultad específico.

El adulto mayor para tomar el camión debe cruzar calles y avenidas con el temor a ser atropellado, en una cultura de falta de consideración al peatón. "Debe subir al camión por escalones muy altos que se le presentan inseguros, con miedo a caer y no poder subir, con la sensación de estar bajo la presión del tiempo y en muchos casos con un chofer que no se detiene cerca de la banqueta".

RAYUELA
 Responsa
 ¿existe es

Nuestra edición

EN ESP...

EN ?

<http://www.lajornadajalisco.com.mx/2013/12/03/piden-cambios-para-reducir-riesgos-para-adultos-mayores-en-transporte/>

transporte-publico.htm Piden cambios para re... Sufren adultos may...

Guadalajara, Jalisco
Jueves, 11 de Septiembre de 2014
Actualizado: Hoy 19:09 hrs

24°

INFORMADOR.COM.MX

Primera **Jalisco** México Internacional Economía Deportes Tecnología Cultura Entretenimiento Suplementos
Seguridad Educación Congreso local Salud Gobierno del Estado Vialidad Municipios

For more details telephone: 0115 848 8000

Temas Importantes: 11 de Septiembre | iPhone | Apple | PAN Jalisco | Grupo Santander | Vida Social |

Sufren adultos mayores al usar transporte público

Nota



Aseguran que uno de los mayores problemas que padecen es al abordar y descender del camión. ARCHIVO

Más información

- Con convocatoria ponen en marcha nuevo modelo de transporte
- Sin definir, unidades que suplen mototaxis
- En diciembre determinarán posible alza a tarifa del transporte

Compartir: ShareThis 371 Email 5 Facebook Share 242

Transporte Público | Municipios | Tercera edad

La cuarta parte de los decesos en accidentes viales corresponden a mayores de 55 años

Proponen una serie de mejoras que van desde eliminar los escalones de las unidades hasta mejorar el pavimento para que los adultos mayores puedan abordar sin problemas

GUADALAJARA, JALISCO (02/DIC/2013). Los adultos mayores sufren al utilizar el transporte público en la metrópoli, padecen desde que salen de su casa con rumbo hacia a la parada, en el abordaje y en el trayecto se enfrentan a diversos riesgos: caminan sobre banquetas con obstáculos, paraderos inadecuados, escalones altos para subir y bajar del camión; el temor a sufrir una caída está presente.

Los escalones de las unidades están a una altura inadecuada, 40 centímetros cuando lo ideal es que sean de 15 centímetros o que no existan; los viajeros tienen miedo al subir o bajar por el riesgo de caer, también se sienten en riesgo de golpearse durante el trayecto.

"Camina hacia su asiento en un viaje inestable, demasiado rápido o con movimientos bruscos y bríncos, en un camión muchas veces

<http://www.informador.com.mx/jalisco/2013/500448/6/sufren-adultos-mayores-al-usar-transporte-publico.htm>

Appendix P

Evidence of the current actions by the Local Authority for improving the bus service

This is a document that comprised evidence of the current actions for improving the bus service by the Local Authority and the major syndicate of bus operators (Document in Spanish).

The document was presented by the Local Authority on the 2nd of April 2014.

The document shows that the inclusive blueprint is being used to present results from this research and for drivers' training.

After the document some news from local newspapers (online) show the presentation and progress of these actions.

Presentación

Buenos días

2 Abril 2014



Orden del día

Temas de la sesión

- Punto de partida
- Problema
- Proyecto
- Ejes del proyecto

Punto de partida

Elaboración de un programa de dignificación, autocuidado y cuidado de los Adultos Mayores por parte de usuarios y operadores del Transporte Público

Problema

“Más valor para una vida mayor”.

La mitad de los fallecimientos en los que ha intervenido el transporte público en Jalisco este año, son personas mayores de 55 años

Proyecto:

“La tercera no es la vencida”

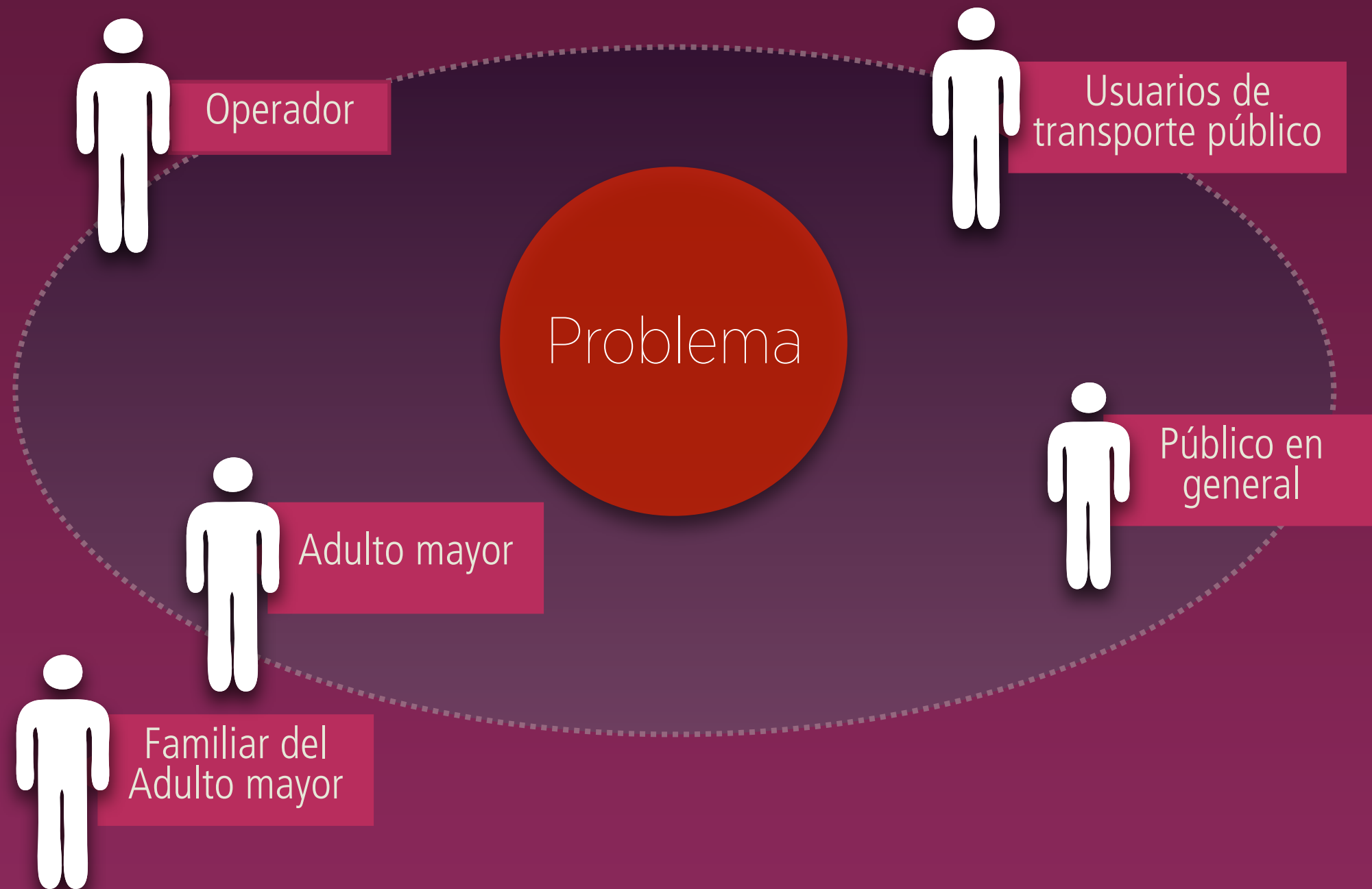
(haciendo referencia a la gente de la tercera edad. Hay varias teorías que dicen que la tercera edad comienza a partir de los 70, otras que afirman que es a partir de los 65 y otras que dicen que a partir de los 55.

La tercera edad es una nueva oportunidad de vivir en plenitud, la vida no termina al envejecer.

“Todos para ellos. Por un respeto al adulto mayor”.

Entendemos que el adulto mayor **enfrenta una situación de dificultad y riesgo** en el uso del transporte público, y que su solución involucra a varios actores: el operador del transporte público, los usuarios de todas las edades, el adulto mayor y su familia.

Problema





INSTITUTO JALISCIENSE DEL
ADULTO MAYOR

¿Qué vamos a hacer? **3 ejes:**

Capacitación a
operadores



Operador

Comunicación

Redes sociales
Webs

Aplicaciones en vehículos del
transporte público



Público en
general



Usuarios de
transporte público



Familiar del
Adulto mayor

Autocuidado adulto
mayor



Adulto mayor

¿Qué queremos lograr?

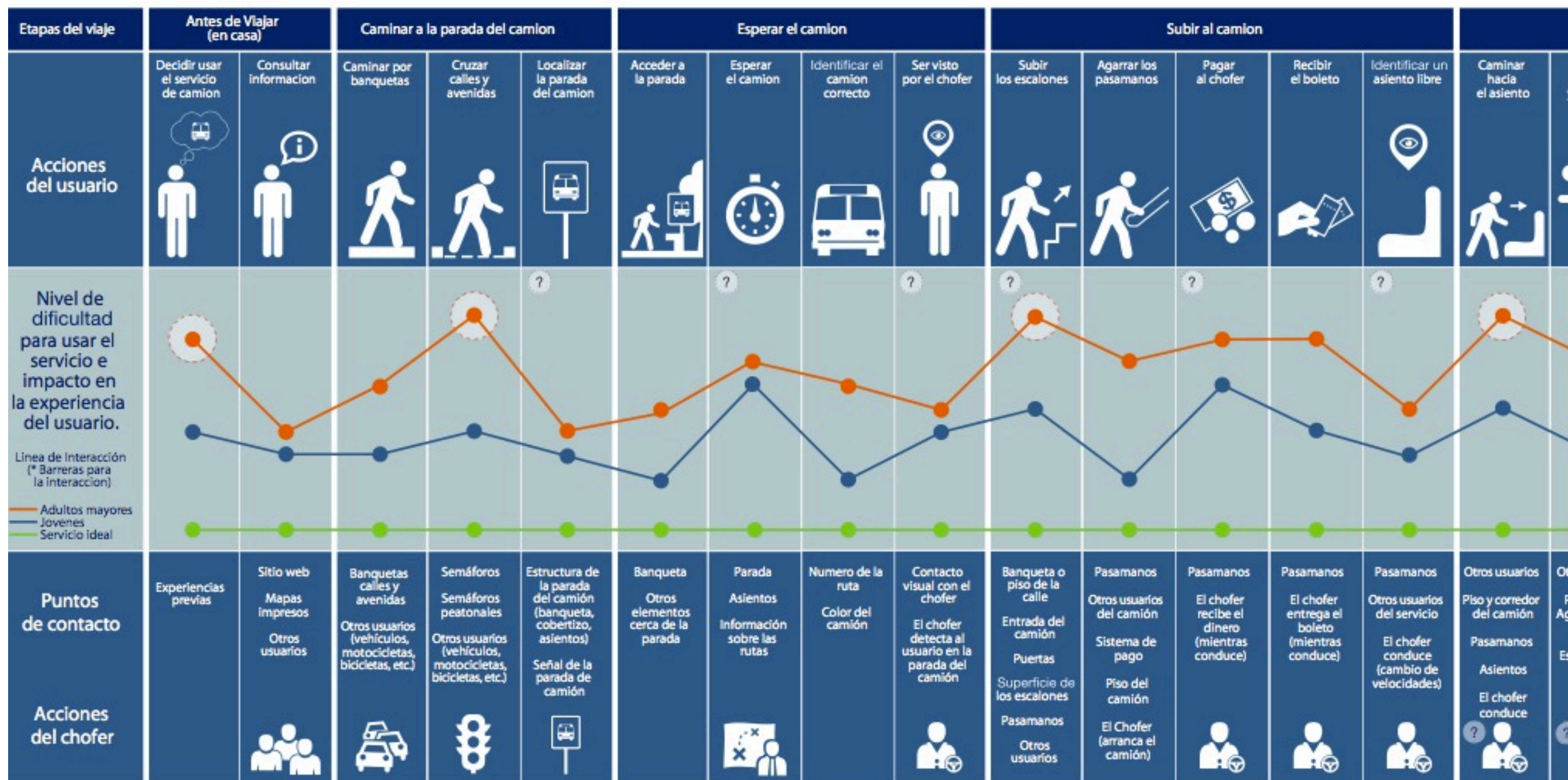
- Sensibilizar a operadores con respecto al adulto mayor
- Sensibilizar al usuario del transporte público con respecto al adulto mayor
- Dignificar al adulto mayor sobre esta campaña que se realiza para su cuidado, promover una cultura de respeto y revaloración del envejecimiento.



“Cuidándolos, te cuidas”

(porque el tiempo es implacable y mañana estaremos en su lugar. Predica con el ejemplo, si hoy los cuidas, los entiendes y apoyas, mañana, cuando llegues a esa edad, las nuevas generaciones harán lo mismo por ti).

Capacitación / estudio



Línea de visibilidad

Colaboración

Por eso es que desde el IJAM y con la colaboración de UNIVA e ITESO, y en una primera etapa del Frente Unido de Subrogatarios y Concesionarios del Transporte Público, estaremos llevando a cabo el proyecto "La tercera no es la vencida".



“Si es seguro para ellos, será seguro para ti”.

Para ello estamos asumiendo el compromiso, junto con la UNIVA e ITESO, de participar en la capacitación de operadores del transporte público para sensibilizarlos respecto a la circunstancia que viven los adultos mayores, bajo la premisa de que

Un transporte público seguro para los adultos mayores, es un transporte público seguro para todos.



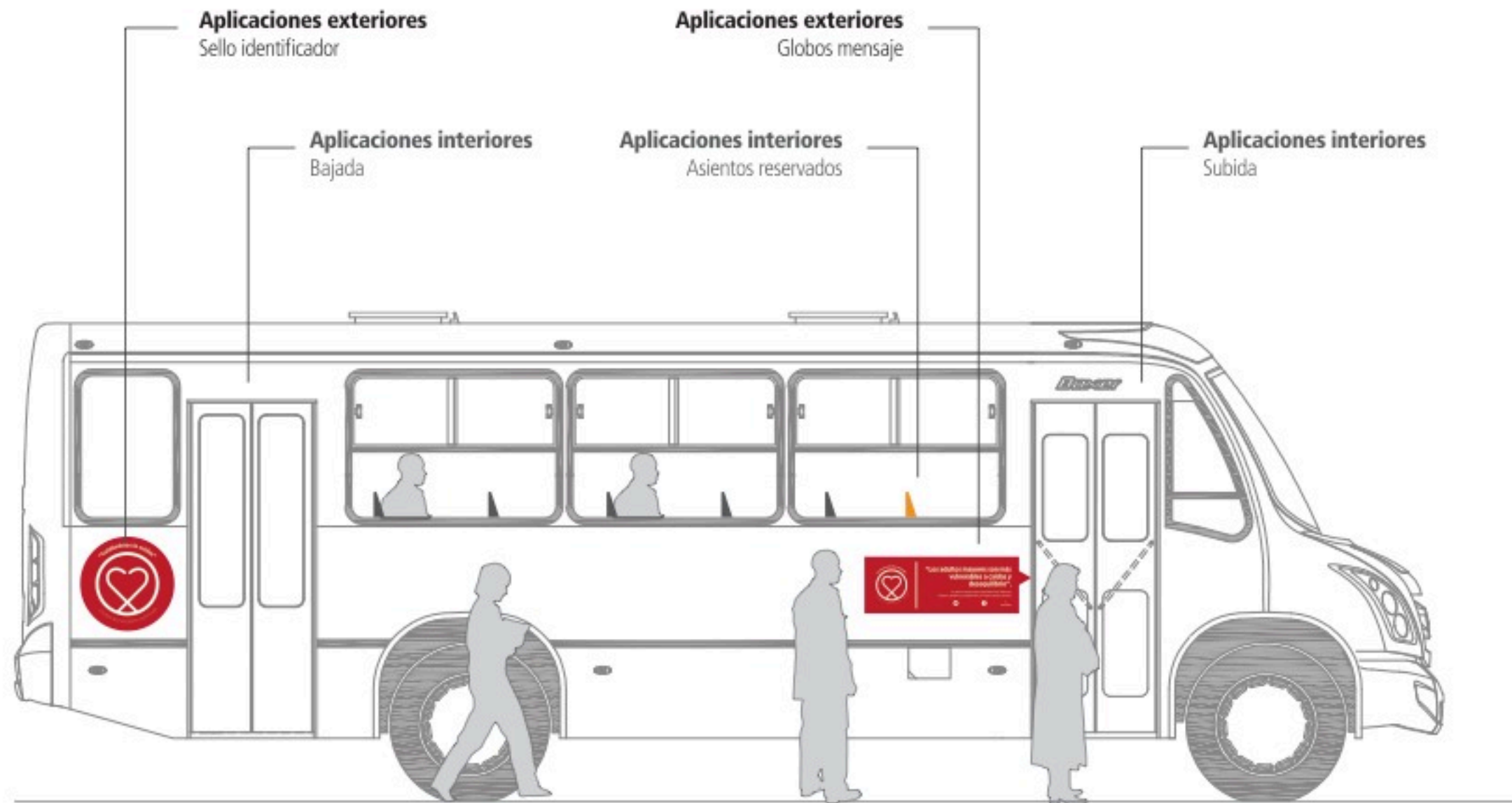
Capacitación

Simultáneamente daremos cursos y talleres para el autocuidado de los adultos mayores que propicie una corresponsabilidad a partir de las propias personas de edad en su seguridad e integridad, y por supuesto, en el conocimiento de sus derechos y la promoción de su autoestima y empoderamiento.



Concepto de campaña

Ubicación de elementos



Ruta 604 y 622

Gracias

2 Abril 2014

ijam.org.mx/atercera

Instituto Jalisciense del Adulto Mayor

Av. Hidalgo #1375 Col. Americana

Guadalajara, Jalisco, México

(33)3030-3000

ijam@jalisco.gob.mx

Inicio	Política	Jalisco	Nacional	Internacional	Cultura	Deportes	Opinión	Patricio Monero
	15:49		15:43	15:25	14:45			1
	Seguridad y empleo, faltantes en el segundo informe de Ramiro: Oposición ...		Chofer frustra asalto en ruta 641 ...	Bachelet pide acabar con el "silencio" a 41 años del golpe de Estado en Chi ...	El fraccionamiento Puerta de Hierro... Intocable ...			1

IJAM capacitará a mil 200 operadores para dar "buen trato" a adultos mayores

3 abril, 2014 | Categoría: Política | Escrito por: Edición Impresa

• La Tercera no es la Vencida concientizará a usuarios de la tercera edad y choferes



Los operadores de unidades "amigas del adulto mayor" recibirán una certificación del IJAM. Foto Arturo Campos Cedillo

Ignacio Pérez Vega.- La mitad de las 16 muertes vinculadas al transporte público en lo que va de 2014 son personas mayores de 55 años de edad. Por ello, el Instituto Jalisciense del Adulto Mayor (IJAM) anunció que hará una campaña para crear conciencia del autocuidado en las personas de la tercera edad y de que los conductores apliquen buen trato a ese grupo de edad, informó el titular del organismo, Luis Cisneros Quirarte.

Está identificado que a bordo de la unidad el mayor riesgo se presenta cuando una persona de la tercera edad camina desde la puerta a tomar un asiento o hacia ubicarse en la parte trasera. Otro punto de riesgo son las escaleras al descender de un camión, refirió Cisneros Quirarte.

Sin embargo, la mayoría de los percances en los que los adultos mayores son atropellados se registran cuando los ancianos cruzan delante de la unidad, informó Juan Carlos Villarreal Salazar, presidente del Frente Unido de Subrogatarios y Concesionarios del Estado de Jalisco (FUSCEJ). Además, mencionó que las unidades que tengan operadores capacitados en el trato a los ancianos se harán acreedores a una certificación por parte del IJAM, como unidades sensibles y amigas del adulto mayor.

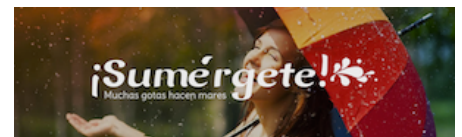
La campaña titulada *La Tercera no es la Vencida* comenzará el 11 de abril en las rutas 604 y 622, dijo Villarreal Salazar. Se harán dos sesiones cada viernes, cada jornada de capacitación tendrá una duración de cuatro horas. En la primera etapa de la capacitación se pretende atender a mil 200 conductores y posteriormente se buscará a operadores de la Alianza de Camioneros, Transportes Unidos de Tlaquepaque, Sistecozome y Servicios y Transportes.

En el diseño del programa de capacitación que incluirá a los conductores y a las personas de la tercera edad, participaron los académicos Margarita Maldonado Saucedo, del ITESO, y Juan Manuel Sotelo Vaca, de la Univa.

“Estamos buscando ejercicios muy puntuales. Por ejemplo, que el mismo conductor sienta lo que es

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poder subirse a un camión con las dificultades que esto implica. Poder agarrarse del pasamanos cuando el camión arranca. Esto va a generar un nivel de conciencia”, expuso Margarita Maldonado.

Se calcula que en una primera etapa, el Instituto Jalisciense del Adulto Mayor y el Frente Unido de Subrogatarios, capacitarán a choferes de 2 mil unidades del servicio subrogado del Sistecozome, de 50 diferentes rutas.

Cisneros Quirarte refirió que así como se va pedir a los conductores que aborden un camión como si fueran ancianos, a los adultos mayores se les pondrá al frente de un volante, para que sean conscientes de las dificultades de conducir un camión o un minibús.

El presidente del FUSCEJ explicó que los conductores que vayan a bordo de una unidad certificada por el IJAM y aún así le den mal trato a un adulto mayor, serán sancionados. Los reportes se podrán hacer al teléfono 30 30 30 00, del IJAM y en redes sociales, bajo la etiqueta #terceranoeslavencida.

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Imagen de una de las unidades de transporte público acondicionadas para personas de la tercera edad.

En pobreza extrema, más de 85 mil adultos mayores de Jalisco
Surge nueva propuesta para la Villa Panamericana

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• Inicia el programa "La tercera no es la vencida"

Son 300 unidades de transporte y 750 operadores los que han sido capacitados para atender a las necesidades de los adultos mayores

GUADALAJARA, JALISCO (29/MAY/2014).- El Instituto Jalisciense del Adulto Mayor (IJAM) en colaboración con el Instituto Profesional de Capacitación para el Transporte Público y el Frente Unido de Subrogatarios y Concesionarios del Estado de Jalisco inauguraron el día de hoy el programa "La tercera no es la vencida".

Dicho programa tiene como objetivo mejorar las condiciones en las que los adultos mayores utilizan el transporte público. Para lograr la meta se impartieron cursos para entrenar a 750 choferes en el cuidado de los ancianos. Asimismo, se colocaron distintivos con el nombre del programa en las 300 unidades capacitadas para que las personas de la tercera edad puedan identificarlas.

"El transporte público es un medio para que los adultos puedan realizar activamente sus actividades cotidianas", declaró Luis Cisneros Quirarte, director del IJAM.

"El adulto mayor es quien en su momento nos cuidó cuando nosotros no podíamos valernos por

nosotros mismos, ahora nos corresponde cuidarlos a nosotros".

Durante el evento, se entregó un reconocimiento a tres de los 750 choferes que fueron capacitados. Los operadores recibieron un diploma en nombre del resto de sus compañeros. El Instituto Profesional de Capacitación para el Transporte Público y el Licenciado Juan Carlos Villareal, líder del Frente Unido de Subrogatarios recibieron una mención por su colaboración en el programa.

Cisneros explicó que, hasta ahora, son sólo 24 rutas las que se han integrado a este movimiento, no obstante, esperan incrementar el número de las mismas y extender la capacitación a un mayor número de choferes.

El dirigente del Instituto Jalisciense del Adulto Mayor llamó también a los usuarios a comprometerse con la causa de "La tercera no es la vencida", pues afirmó que, si bien los choferes ya han sido capacitados para tratar con las personas de la tercera edad, a muchos pasajeros comunes aún les falta sensibilidad para atender a las necesidades de las personas más vulnerables. "Creemos desde el IJAM que es necesaria la participación entera de toda la sociedad y la academia", aseguró Cisneros.

EL INFORMADOR / DANIELA CASTILLO



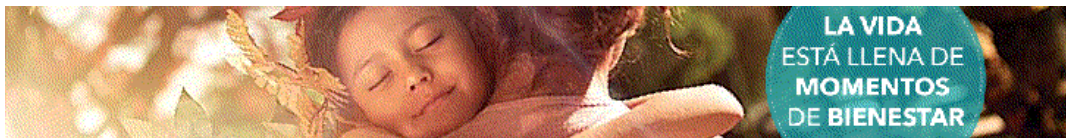
Notas del Tema

- :: Grupo sanguíneo AB estaría vinculado a la pérdida de memoria Sep-11 16:08 hrs
- :: Carecen de rampa cuatro de cada 10 puentes peatonales Sep-10 04:09 hrs
- :: Exhortan a que adultos mayores cuenten con evaluación geriátrica Sep-06 19:24 hrs
- :: Adultos mayores deben cuidar sus pies para evitar problemas al caminar Sep-06 14:03 hrs
- :: Una noche de circo y fantasía en pro de los más necesitados Sep-04 19:55 hrs

Pregunta de Jalisco

¿Cuál es tu postura sobre la prohibición al uso de animales en espectáculos circenses en Guadalajara?

- ☐ Estoy de acuerdo
- ☐ Ya no iré a los circos
- ☐ No me parece justo
- ☐ No me interesa



Inicio	Política	Jalisco	Nacional	Internacional	Cultura	Deportes	Opinión	Patricio Monero
	14:45 El fraccionamiento Puerta de Hierro... Intocable ...			12:21 A 41 años del Golpe de Estado contra Salvador Allende ...		11:11 Firmas al Senado ...		08:00 The Oaths vuelve para ponerle ritmo a las pistas de baile ...

Capacitan a los choferes para tratar mejor a personas de la tercera edad

30 mayo, 2014 | Categoría: Política | Escrito por: Edición Impresa

• 24 rutas del transporte público fueron certificadas como amigas del adulto mayor; buscan dar mayor seguridad a estos usuarios

Ignacio Pérez Vega.- Un total de 24 rutas del transporte público recibieron la certificación como unidades amigas del adulto mayor, otorgada por el Instituto Jalisciense del Adulto Mayor (IJAM), con el objetivo de que ofrezcan un mejor trato a las personas de la tercera edad, ya que la mitad de los 24 decesos ocurridos en lo que va del año en accidentes vinculados al transporte público en la ciudad, son personas mayores de 60 años de edad.

Luis Cisneros Quirarte, director del IJAM, dijo que se capacitó a 750 conductores del servicio subrogado del Sistecozome, que pertenecen al Frente Unido de Subrogatarios y Concesionarios, a quienes se les hizo un ejercicio en el que se les colocó en el papel de ancianos que quieren bajar o subir de los camiones, para que adquieran conciencia y los cuiden.

“Buscamos que estos cursos no fueran meramente teóricos, sino que fueran prácticos, que cada uno de los operadores viera el otro lado, el lado del adulto mayor que tiene dificultades para trasladarse, que el transporte público es su medio para seguir participando activamente y que a veces los camiones son muy inseguros”.

Cisneros Quirarte señaló que ahora están en auge los derechos de los animales para evitar su maltrato. “Eso está bien, pero los derechos de las personas de la tercera edad están el olvido”,. Hasta el momento, son 700 las unidades a las que se les colocó un distintivo de la campaña La Tercera no es la Vencida, que busca crear conciencia de proteger los derechos de los adultos mayores.

Durante el acto realizado en la plaza Brasil, el IJAM entregó reconocimientos a algunos de los conductores capacitados, entre ellos a Víctor Hugo López Vélez, quien dijo que tienen la autorización de sus patrones, de dar más tiempo para subir y bajar de la unidad a los pasajeros de la tercera edad. El operador de la ruta 603 B refirió que el taller que tomó le sirvió para tener una actitud diferente hacia los adultos mayores o quienes traen un bastón, cuyos movimientos son más lentos.

La capacitación que se dio a los 750 operadores incluyó sesiones teóricas y prácticas sobre la condición de los personas mayores de 60 años, además de conocer las necesidades que tienen también otros pasajeros de grupos vulnerables, como son las personas débiles visuales, invidentes, silentes y quienes se desplazan en sillas de ruedas.

Por su parte, el presidente del Frente Unido de Subrogatarios y Concesionarios, Juan Carlos Villarreal, señaló que la certificación de los conductores y las unidades de 24 rutas es un hecho muy importante que reducirá la cifra de percances en los que se ven involucradas personas ancianas.

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