GOAL
Growing Older, staying mobile:
Transport needs for an ageing society
Collaborative Project
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Deliverable D4.1
Older People and Public Transport

Confidentiality level: Public
Executive Summary
The increasing population of older people in the Europe is producing considerable challenges for future transportation systems. The aim of the GOAL project is to review current knowledge and identify research gaps in order to develop an action plan for innovative solutions to fulfil the transport needs of an ageing society. The physical and mental characteristics of older people were used to develop profiles which represented the range of characteristics to be found in the population now and in the future (GOAL, 2012). These profiles are being used to explore in a structured way the needs while driving, using public transport, walking and cycling and the relevant information needed before and during travel.

For many older people facing physical, mental, psychological and economic barriers to travel, public transport may be the only way to access essential health, economic and other services including important social contact. This deliverable critically reviews public transport provision and associated facilities from the perspective of the needs of the elderly and produces recommendations for further research. Accessibility, affordability, availability and acceptability are key issues for older people. These issues were assessed for the public transport needs of GOAL profiles of older people (Fit as a fiddle, Hole in the Heart, Happily Connected, An oldie but a goodie, the Care-full). The assessment showed that needs differ between profiles. It also showed that many of the needs have been addressed or recognised in national and EU level policies. This has resulted in a number of best practices covering aspects of public transport (especially accessibility issues) being implemented in various local, national and EU levels in different countries. Whilst directives and guidelines have also been developed to standardise such implementations, the level of implementation has been found to vary considerably.

The analysis of current provision against the needs of different GOAL profiles of older people showed that knowledge gaps exist, and the following are recommended for future research:

• The development of a methodology to assess the benefits of accessibility measures
• Research on the issues of transition from a car focussed to a public transport focussed lifestyle
• Safety concerns related to using public transport
• The identification of measures to influence bus driver attitudes and behaviour
• The development of older people friendly information system
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1 Introduction

1.1 The Project GOAL

The aim of “GOAL – Getting Older, Staying Mobile” is to provide an action plan for innovative solutions to fulfill the transport needs of an ageing society. This action plan will be developed through interaction with different stakeholders, state-of-the-art reviews, identification of possible and relevant societal developments and the alternatives to transport. The focus of GOAL is on land-based transport. Current predictions of EUROSTAT show that “The share of people aged 65 years or over in the total population is projected to increase from 17.1% to 30.0% and the number is projected to rise from 84.6 million in 2008 to 151.5 million in 2060. Similarly, the number of people aged 80 years or over is projected to almost triple from 21.8 million in 2008 to 61.4 million in 2060”. It is vital that older people, now and in the future, are able to travel and have access to acceptable levels of mobility, in order to keep them actively involved in their daily activities.

Older people have specific needs with respect to travelling. Earlier GOAL work described the physical and mental characteristics of older people and used these to develop profiles which represented the range of characteristics to be found in the population now and in the future (GOAL, 2012). These profiles are being used as a basis to explore the needs while driving, using public transport, walking and cycling, and the information needed before and during travel. The profiles are also being used to address additional issues of older people which may impact on travel decisions.

1.2 The workpackage

This workpackage is focussed on older people and public transport, walking and cycling. For many older people physical, mental, psychological and economic barriers decrease flexible travel and public transport may be the only form of way to access goods, services, employment and other activities, including important social contact. In this context, public transport provision and associated facilities from the perspective of the needs of the elderly are reviewed in this workpackage and recommendations for further research are produced. The work is being extended to walking and cycling modes. The specific objectives of this work package are to:

- Review what public transport, cycle and walking facilities, systems and services are available and how effective they are in meeting the needs of the elderly.
• Identify the latest developments and possible future systems and services, and review the available evidence of their likely impacts and opportunities for use by the elderly.

• Identify and develop guidance where adequate supporting evidence exist

• Identify the research needed to fully understand the needs of the elderly for public transport, cycling and walking systems and service, and for the development of such systems and services.

These objectives are achieved through tasks categorised into two parts: Public transport systems and services for older people; and Older people and walking and cycling. Based on these two tasks, two deliverables will be produced. This is the first of these deliverables and is concerned with public transport systems and services for older people. A separate deliverable will be produced based on the second task - Older people and walking and cycling.

1.3 The deliverable

This deliverable includes:

• A Review of current facilities and best practices available to benchmark the facilities available across Europe. This includes “hard” aspects such as infrastructure and vehicles as well as “soft” aspects such as service, safety and communication;

• Analysis of the needs and available facilities and development of a methodology to identify deficiencies in available facilities from an elderly person perspective; and

• Propose future research requirements to support the delivery of improved systems and services for the elderly.

This report is mainly based on reviews of existing research findings. An understanding of the requirements of different categories of older people for public transport is provided and these requirements are then related to the facilities available currently or in the future. This deliverable contains the following main sections:

• Older people and public transport (Section 2)

• Public transport needs of older people (Section 3)

• Current provision for older people using public transport(Section 4)

• Holistic approach to public transport needs (Section 5)

• Analysis of needs and current provision (Section 6)

• Conclusions and recommendations (Section 7)
2 Older people and public transport

2.1 Background

People’s life expectancy is increasing throughout the world as result of medical advances and improved living standards. In the EU, life expectancy at birth is projected to increase by about 8 years from 76.7 in 2010 to 84.6 in 2060 for males and by 6.5 years for females, from 82.5 in 2010 to 89.1 in 2060 (EC, 2012). This will result in a rapid increase in the number as well as the proportion of the older people. It is predicted that the population aged 65 and above will almost double, rising from 87.5 million in 2010 to 152.6 million in 2060 in the EU (EC, 2011). As may be seen in Figures 2.1 and 2.2, the proportions of older people in the populations of all the EU-27 countries continue to increase (ONS, 2012).

![Figure 2.1: Percentage of persons aged 65 and over EU-27, 2010 (ONS, 2012)](image1)

![Figure 2.2: Percentage of persons aged 65 and over EU-27, 2035 (ONS, 2012)](image2)
In the UK, the population of older people is set to continue to rise as may be seen in Figure 2.3. By 2035, 23 per cent of the UK population is projected to be aged 65 and over (ONS, 2012).

![Percentage of older people in the UK 1985, 2010, 2035](image)

*Figure 2.3: Percentage of older people in the UK (ONS, 2012)*

The natural ageing process is accompanied by physiological changes which can have consequences for mobility. For example, a list of age-related changes and their consequences for mobility were determined by Gewalt and are presented in Table 2.1 (Gewalt, 2011).

*Table 2.1: Age-related changes and their effects on mobility*

<table>
<thead>
<tr>
<th>organ/system</th>
<th>Age-related changes</th>
<th>Possible consequences of physiological age-related changes</th>
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<tbody>
<tr>
<td>sense organs</td>
<td>• Eyes: presbyopia, cataract&lt;br&gt;• Ears: impaired high-frequency hearing&lt;br&gt;• Decreased sense of touch</td>
<td>• Impairment of visual perception&lt;br&gt;• Single spoken words are harder to disting and understand, especially with background noises.</td>
</tr>
<tr>
<td>musculoskeletal system</td>
<td>• Decreased skeletal muscles&lt;br&gt;• Reduced flexibility of ligaments, muscles, sinews&lt;br&gt;• Reduced mobility of joints</td>
<td>• Reduced flexibility and strength&lt;br&gt;• Increased vulnerability to bone fracture</td>
</tr>
</tbody>
</table>
As a consequence of such age related changes, older people tend to make fewer journeys than other adults. In addition, one study found that “almost all older persons, regardless whether they participate in walking, cycling, driving or using public transport, suffer from the tighter and more aggressive traffic. Lack of consideration and social support as well as hectic pace and aggressiveness are considered problematic.” (Mollenkopf & Flaschenträger 2001).

In addition to the reduction in overall mobility, transport uses by older people also changes with the age. After 55, car usage was found to decrease constantly, whilst walking increased and public transport become a more used alternative for those aged 75 or older (see Figure 2.4 (MiD, 2008)).

![Figure 2.4: The Change of most important mode of transport (MiD 2008)](image)

The biggest change in the transport mode used is the transfer from car (driver). With age, older people start to walk more, drive less and use more public transport. The importance of public transport and walking for the independence of older people was highlighted in research carried out in the London area (Su and Bell, 2007). With an increasing number of older people, the use of public transport by older people is set to rise. In addition, the current generation of older people is more active than previous generations of equivalent age and has higher car ownership rates (Follmer et al, 2009). They like to travel more than their predecessors to maintain a more active life style. However, many older people face physical, psychological and economic barriers to travel, including diminished motor, sensory and cognitive abilities for some (ECMT, 2002). For many of those not able to drive, public transport could be the only form of transport available for them.

Public transport usage also has to be seen from a gender perspective. Older women are more likely to consider public transport as an alternative than men (Devey and Nimmo, 2003). This may be related to the role of women over the course of their life due to
domestic responsibilities, the absence of a driving licence, or the existence of only one car in the household which is used by the partner to go to work everyday. Thus the availability of public transport suitable for older people is socially important to maintain a gender balance in activities.

2.2 Public transport use by older people

Available, effective and affordable transport facilities are important to secure the ready access to people and places necessary to maintain a good quality of life (Metz, 2003). Access to public transport can help older people to avail themselves of goods, services, employment and other activities. Travel purposes of older people revealed from a survey carried out in Germany are shown in Figure 2.5. Public transport is important to older people’s quality of life, their sense of freedom and independence. Access to good and convenient public transport was emphasised as being an important factor by respondents to an extensive survey in the UK (Gabriel and Bowling, 2004). Recognising the importance of public transport for independent living of older people and their participation in society, accessible public transport is also included in the World Health Organisation’s checklist of essential features of age-friendly cities (WHO, 2007). WHO (WHO, 2007) proposed that an “age-friendly” city is one that promotes active aging; which means it optimises opportunities for health, participation, and security in order to enhance the quality of life as people age.

Figure 2.5: Motives of travel by age group (MiD 2008)

Shopping and leisure are the main motives for travel of those over 60 (Figure 2.5). It may also be seen from the Figure that job related travel decreases with age. Access to healthcare, food shops, post offices and other cultural, social and leisure facilities (including libraries, leisure centres, non-food shops, town centres and places of worship) were
considered important in a review of local transport accessibility planning (Help the aged, 2006). Of these, healthcare was overwhelmingly recognised as a key service to which access was important.

With various initiatives to improve public transport for older people, the number of elderly people using buses is increasing. Studies indicate that buses are already a well used form of transport for the elderly in the UK (DfT, 2012). It may be seen from Figure 2.6 that there has been a modest increase in the number of elderly people using buses at least once a month or more in the last decade.

![Figure 2.6: Bus use frequency of persons aged 60 and over since 1998/00 (DfT, 2011)](image)

This increase in bus usage, combined with the rising number of elderly people, means that bus transport will need to be able to cope with an increased number of elderly travellers in the future.

### 2.3 Barriers for using public transport by older people

Despite the need for public transport, older people face a number of barriers when undertaking journeys. These have been identified by earlier researches (Help the Aged, 2006 and Gilhooly et al, 2006), and include: Physically inaccessible transport vehicles, safety concerns, attitudes of transport staff, difficulties in carrying heavy loads, services running late, behaviour of some passengers, affordability and poor cleanliness. Fiedler (2007) identified the requirements to overcome such barriers as: improved image of public transport, approachable staff, accessible vehicles and easier ticketing schemes. The Keep Moving survey (Kim, 2008) which focused on perceptions towards travel options found that, overall,
driving a car is seen as the best travel option followed by car passenger and walking (Figure 2.7).

![Figure 2.7: Valuation of transport mode (KiM, 2008)](image)

As evident from the Figure, cycling and public transport are seen as the worst travel options. Reasons for this include the emerging physical disabilities in older ages which limit active mobility options. The low appreciation of public transport can also be caused by poor services, as has also been highlighted in other studies. A focus group survey carried out in the USA (TCRP, 2002) reported that the group members had a much more favourable opinion of car travel than of public transport. They viewed public transport as having very few positive attributes including affordability (low cost), independence (the ability to come and go on one’s own schedule and the amenities associated with traveling as a passenger (reading, watching the world go by, etc.). By contrast, strong negative attributes were unreliable services, poor travel information, problems with public transport staff. Another study in Sweden (Waara, 2009) revealed that the cost of travel, poor accessibility, insecurity when travelling alone and difficulty in accessing traveller information as the top four reasons (with more than 20% respondents) for an unsatisfied travel need. Elderly people typically have more “physical, psychological and economic barriers which can include some diminished motor, sensory and cognitive abilities” (ECMT, 2002). These difficulties often make it challenging for the elderly to travel. Remedial measures should not be restricted to facilities on the buses themselves, but also need to encompass other aspects, such as the ease of travel to and from bus stops, the awareness of the bus staff and public, and electronic aids (such as announcements on the buses for each stop).

Recent research carried out in Australia (Broome et al, 2010) found: ‘unsuitable timetable’, ‘bus stop location’, ‘difficult entry/exit’, ‘inappropriate route/destination’, ‘drivers not friendly’ and ‘lack of facility at bus stop’ as the top barriers for older people to
use buses. Another study (Wretstrand et al, 2009) showed ‘difficult to board/alight’, ‘bus stop too far’, ‘afraid of travelling alone’, ‘personal service poor’, ‘difficult to get a seat’, ‘Travel time too long’, ‘Routes and timetable’, ‘Poor scarce information’ and ‘Tickets too expensive’ as among 13 main reasons for not using local public transport. In the study, bus stop distance emerged as a key factor influencing bus use. Those living too far from a bus stop (outside their walking capability range) consequently did not use buses. The study concluded the need for a two-pronged approach:

1. Accessibility assessment: measurement in the environment (PT system and infrastructure) could be objectively assessed according to norms and standards, while simultaneously considering the functional capacity of the target groups.
2. Usability assessment: The environment (system and infrastructure) could be investigated by applying a user’s subjective perspective, through interviews and observation.

In addition, the needs of older people also vary from person-to-person depending on their physical condition and their disabilities. Five main areas identified as constituting significant barriers for older and disabled people in an Accessible Transport Strategy for Northern Ireland include (DRDNI, 2005) were physical, attitudinal or psychological barriers, accessible information, services needed by older and disabled people; and affordability. These barriers to using public transport constitute major lifestyle challenges for older people who are more dependent on public transport, and the barriers must be understood and addressed.

### 2.4 General requirements of older people using public transport

The needs of older people using public transport have previously been studied by different authors by considering them in groups with particular characteristics. Neugarten (1974) and Baltes (1997) distinguished older people in different age intervals and explored the needs for each of those intervals. The GOAL profiles (GOAL, 2012) developed in this project is based on the age, health and other activities of the older people. In the Euro Access project (Ståhl and Wretstrand, 2008), a differentiation was made based on the impairments of older people: mobility impairments, visual impairments, hearing impairments, cognitive impairments. The main requirements for these different impairments are given below.

For mobility impairments (MI, in Figure 3), the main requirements are:

- inability to walk requirements;
- contrast-marked stanchions, handholds and other gripping aids;
- seating next to the entrance doors;
• operating controls placed at the level of and proximate to the trunk.

Sustaining mobility is a key issue for groups that have limitations in their activities. Even if a proportion of mobility impaired people are very old, they need barrier-free environments, infrastructures and vehicles. Out-of-home mobility is a crucial prerequisite for autonomy and well-being. Older persons living singly, women, people with health problems and few economic resources, and rural older people tend to be particularly at risk of losing their abilities to travel. Further support and stimulation to enhancing out-of-home mobility in later life must focus as much on transport policy measures as on appropriate social policy measures (Mollenkopf et al, 1997).

For visual impairments (VI, in Figure 3), the main requirements are:

• mobility impairment requirements;
• orientations through markings: colour contrasts and differences in brightness;
• equipment, interior elements, operating controls and communication systems identified by contrasted design, supported by light sources;
• operating controls and communication systems similarly designed, with tactile, illuminated elements;
• visual information, proximate sufficient letter height, easily understandable audible announcements;
• standardized design for easy recognition.

Visual impairment is the consequence of a functional loss of vision, resulting from disease, trauma, congenital or degenerative conditions that cannot be corrected by conventional means, including refractive correction, medication, or surgery. Despite the use of glasses, visual acuity among visually impaired people is reduced to 1/3 – 1/50 of normal values. Furthermore, the field of vision is limited and some also have high glare sensitivity. In areas with poor contrast and lighting, this results in orientation difficulties. Low obstacles and objects in peripheral areas “disappear”. A relatively large group of people affected by colour weakness or colour blindness are unable to distinguish certain colours (commonly green-red) or any colours at all. Thus, the overarching design ideas targeting visual impairments needs should enable them to orientate themselves inside vehicles.

For hearing impairments (HI, in Figure 3), the main requirements are:

• external displays;
• internal display showing time, next stop, time to next stop and possible connections;
The hearing impairment group includes people with mild and moderate hearing loss. Sound levels and ranges are reduced, and the sound is often distorted. Common causes are excessive noise and the result of ageing. For people with hearing impairment, visual perception is crucial. However, buses, coaches, trams and trains often provide only audible information. For the safety of all passengers, but particularly those who are deaf or hard-of-hearing, there is a need to display all on-board audio announcements in text format and in real-time. This includes messages from on-board personnel concerning connections, emergency instructions, schedule changes, etc. (Rutenberg and Hunter-Zaworski, 2007).

For cognitive impairments (CI, in Figure 3), the main requirements are:

- visual and hearing impairment requirements;
- simple and understandable display;
- simple and understandable route maps;
- operating control with clear and easily memorable pictograms;
- reducing anxiety and promoting comfort and safety equipment.

This group of people have difficulty in understanding complicated information or in using complex facilities. There are very few guidelines available for a transport system addressing the needs of people with cognitive disabilities. Thus, systems must be easy to understand, concise, and consistent. People with cognitive impairments or learning disabilities could benefit from an increased use of pictures (pictograms, symbols, “story-board”) and consistency is particularly important.

The above requirements could be addressed by the implementation of appropriate tools and design solutions. Based on previous studies, scientific paper and best practices reports (Mediate, 2008), a table of the actions performed by passengers using public transport and older people friendly tools/design solutions has been developed (Table 2.2). The table is intentionally generic so that it can be applied to all possible transport vehicles (buses, trams, trains, metro/underground, coaches, taxis and other demand responsive transports): some of the possible solutions are common and clearly identifiable; some can be differentiated depending on the vehicle characteristics. The chosen impairment categories for which the tools and design solutions are more useful are also indicated.
Table 2.2: User needs vs. tools and design solution

<table>
<thead>
<tr>
<th>Passenger actions</th>
<th>Tools and design solution</th>
<th>MI</th>
<th>HI</th>
<th>VI</th>
<th>CI</th>
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<tr>
<td>Vehicle recognition</td>
<td>External displays (front, side, entrance and rear) showing route and destination</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td></td>
<td>External audible information</td>
<td>X</td>
<td>X</td>
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<td>X</td>
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<tr>
<td>Vehicle access</td>
<td>Wide access area</td>
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<td>X</td>
<td>X</td>
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<td>Real-time route information</td>
<td>GPS navigator on internal display</td>
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<td>Passenger informative systems</td>
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<td>Signals with a simple intuitive graphical design</td>
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<td>On vehicle larger maps of the network, larger print timetables</td>
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<td>Passenger movements</td>
<td>Visible handrails (high contrast) with high-grip ergonomic surface, well placed inside the vehicle</td>
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<td>Non-slipping floor</td>
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<td>Enough space for movements</td>
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<td>High-contrast interior design</td>
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<td>Passenger transportation</td>
<td>Reserved seats near the entrances, clearly designated (e.g. colour and clear signs)</td>
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<td>Vehicle stopping</td>
<td>Easy button operation with audible and visual feedback</td>
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<td>Vehicle comfort</td>
<td>Minimize vibrations</td>
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<td>Passenger stabilizing system during vehicle turns</td>
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<td>Visual and acoustic anticipation of imbalance conditions</td>
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<td>Security systems</td>
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<td>Assistance key</td>
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<td>Specific disability items</td>
<td>Designed place for wheelchair, EC rules conformity</td>
<td>X</td>
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<td>Designed place for assistance dog</td>
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<td>Assistance key</td>
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<td>Vehicle exiting</td>
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<td>Retractable ramps to improve access from platform to vehicle</td>
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<td>Doors functioning with tactile sensors</td>
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<td>Visible handrails (high contrast) with high-grip ergonomic surface, extending beyond the edge of the vehicle</td>
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Apart from the user perspective, the needs of older people could be explored from a system perspective (i.e. what are the characteristics of a system suitable for older people). The next section discusses the needs of older people in terms of the main attributes of older people friendly transport (Section 3).
3 Public transport needs of older people

To make public transport an attractive alternative for older people, all the elements of the public transport chain need to be considered. These elements include:

- Finding information about the service and bus stop location
- Walking to bus stop
- Waiting at bus stop
- Stopping the bus
- Boarding a bus
- Purchasing/validating a ticket
- Moving to a seat
- Bus journey
- Indicating for bus to stop
- Moving to exit
- Disembarking
- Walking to the destination

If any of these elements is unsuitable for older people, they may not be able to access public transport at all, however excellent the remaining elements. These issues included accessibility of stations and bus stops, design of vehicles, availability of information, ease of boarding/alighting, wayfinding etc. An integrated approach combining “hard” aspects such as infrastructure and vehicles with “soft” aspects such as service, safety and communication.

For example, accessible buses are highly important, but they are not the sole solution for providing seamless travel or participation for all: passengers will never use the low-floor buses, if the streets are dangerous and over-crowded. This statement is also supported by the results of the European funded project “European Bus System of the Future” (EBSF, 2008-2012, www.ebsf.eu). The project reviewed the user needs on the basis of the current state-of-the-art complemented by the information collected from several groups of users: public transport users (regular users, passengers with special needs, and occasional users), the public transport operator, public and transport authorities, other road-users (as potential new users) and the industry. The survey results showed that regular users are concerned not only with the conditions on board the bus, but also with the ease of the entire trip (from its planning to its conclusion in a door-to-door logic) (EBSF, 2010). In particular they are sensible to the service quality, which can be summarized in the following points:
• Personal security (at the station/stop and on the bus).
• Certainty of the travel (being on the right bus, travelling to the right destination/direction, having the right ticket).
• Rapidity, Reliability and Frequency of the service.
• Continuity of the service (temporal and physical).
• Comfort and cleanliness (at the station/stop and on the bus).
• Customer care and welcoming environment/staff.
• Real time information.
• Affordability of the fare system.

The survey also provided information on users with special needs. In the project, this category included several user groups ranging from elderly and people with temporary or permanent disability to children and students. Although the information cannot be disaggregated only for elderly and impaired users, the results demonstrate that these groups have additional needs on top of the regular users. A user-oriented system approach to accessibility impacting on both the conditions on board and off board the vehicle is required. Special expectations were also identified for information delivery, general friendliness of the bus system and the removal of physical and psychological barriers.

There are various ways of looking at an ideal public transport system for older people. Earlier research promoted an idea of 5 A’s of public transport need for older people (Beverly foundation, 2003): availability, acceptability, accessibility, adaptability and affordability (Table A1 in Appendix A). However, other studies such as that by Borges (2007) listed the issues as: accessibility, safety, affordability, availability and acceptability. A resource guide recently developed by UK Department for Transport (DfT, 2010) and the pteg’s report (pteg, 2010) gave the four main issues as: affordability, availability, accessibility and acceptability. In this section, the public transport needs for older people is discussed on the basis of these four issues. The whole journey concept is further addressed in Section 5.

3.1 Accessibility

Accessibility is a key issue for older people using public transport. Buses, bus stops and approaches need to be useable by older people. The importance of accessibility was recognised in the European Conference of Ministers of Transport where it was stated that
“Accessibility is increasingly recognised as a key element of a high-quality, efficient and sustainable transport system. Indeed all of us as users of the transport system benefit from easier access to buses, trams, trains, planes and ships. The economic benefits of better accessibility for transport operators and service providers are also becoming progressively clear” (ECMT, 2006). Various studies have been carried out to examine the issues of older people and people with disabilities. For example, UNDP (2011) carried out a review of best practice to provide accessible public transportation for persons with disabilities. Similarly the MEDIATE Project (MEDIATE, 2008) developed indicators of accessible public transport (Table A2 in Appendix A). As a result of such studies, various national and EU directives, guidelines and best practices to improve accessibility have been developed (e.g. European Bus Directive (EC, 2001), ECMT good practice (ECMT, 2006), TCRP report 82 (TRB, 2002)).

Despite the progress made in recent years in improving accessibility for all, it is estimated that 10 to 20 percent of European citizens, including people with disabilities and older people, still experience barriers and reduced accessibility to transportation (Borges, 2012). The largest barriers to older people’s use of public transport include: uneven and narrow pavements, boarding/alighting from buses and trains, steps in stations, lack of or inadequate pedestrian crossings, lack of accessible information (e.g. ticketing, travel information, language accessibility, customer service, lack of awareness of special transport services, etc.). Accessibility of public transport needs to cover these various aspects in consideration of end-to-end journey taking account of all the components such as bus, bus stop and bus stop approach. This end to end journey consideration is developed as a model in Section 5.

3.1.1 Bus

Bus accessibility is important for older people. The accessibility issue is prominently featured in the European Bus Directives (EU, 2001), and in the ECMT’s report (2002) proposing implementation of the recommendation of COST 322 – Low floor Buses (EC, 1995). The issues of disabled and older people using long distance bus travel were examined in the COST 349 Action – Accessibility of coaches and long distance buses for people with reduced mobility. Once in the vehicle, older people need to have a seat available and to access it. In the EMTA report (Fielder, 2007), unsuitable equipment and furniture inside the vehicles was mentioned by only few (7%). However, improvements in this area are possible, especially with respect to ingress and egress (Bronkhorst & Krause 2005, Lijmbach et al. 2012). This is important for elderly because there may not be enough time: to sit down before the vehicle starts moving; and to get up and out once the vehicle has stopped.
Following the suggestion of Iwarsson and Ståhl (2003), accessibility is the “encounter between the person’s or the group’s functional capacity and the design and demands of the physical environment”, and as such, it “refers to compliance with official norms and standards”. Quite recently, the concept of accessibility often goes together with the concepts of Design for all, Usability and Universal Design, the concept of designing products and environment to be aesthetic and usable to the greatest extent possible by everyone, regardless of their age, ability, or status in life. Following these principles the easy recognition of the bus stop, where a passenger wants to get off the bus, announced from loudspeakers and/or clearly shown on a display inside the vehicle, can be useful for all users, regardless from their (dis)ability or age. Taking into account some Universal Design principles that can be applied to public transportation vehicles, the following general requirements are:

- smooth, steeples entrances,
- surfaces texture that require minimal effort to traverse;
- stable, firm and slip resistant surfaces;
- adequate turning space;
- components that do not require tight grasping, pinching or twisting of the wrist
- components that require little force to be operated;
- bright and adequate lighting;
- clear audio communicating system, combined displayed information;
- increased visual contrast on panels;
- using intuitive pictograms associated with simple text descriptions;
- control buttons labels printed with oversized characters.

From older people’s perspectives, the attributes of an ideal bus include:
- smooth, steeples entrances (low floor, kneeling facility)
- Handrail
- Priority seating facility (in the front part)
- Information facility
- Wheelchair space
- stable, firm and slip resistant surfaces
- Unobstructed aisle
- bright and adequate lighting
- Well-illuminated, large, clear bus route number
- Bus route number on front, back and side
3.1.2 Bus stop

The bus stop is a crucial part of a public transport journey. For example, older people may not able to use a bus service due to the condition of a bus stop and/or the condition of the access leading to the stop from their residence. These factors include: poor seating facility, dilapidated condition of the shelter, safety concerns as a result of lighting/visibility (obscured location) and comfort (protection from rain and wind). An earlier survey found that road crossings and bus stop facilities are amongst the main factors deterring older people from using public transport (Marsden et al, 2008). Similarly, in another study in the US, the primary reasons given by older people for not using a bus were: not being able to stand long enough to wait for the bus; and not having shelter from the poor weather (Koffman et al, 2010). In the EMTA report (Fiedler, 2007) 48% said that there was not a comfortable place to wait for the bus.

Routes with isolated stops, bad lighting, no shelter and with no seats or benches prevent older people using public transport facilities especially in cold weather. The importance of bus stops was also recognised in European projects such as the KOLLA project in Gothenburg (PT Access, 2008). Recognising the importance of bus stop for bus journeys, Transport for London (TfL) developed “Accessible Bus Stop Design Guidance” (TfL, 2006). The features that need to be considered for a good bus stop environment is illustrated in Figure 3.1.

![Figure 3.1: Accessible bus stop design guidance (bus priority team, January 2006)](image-url)
From an older person’s perspective, the attributes of an ideal bus stop include:

- Close to the residential areas of older people
- Information about bus services (preferably real time information, published timetable, local map)
- Audible announcement facility for visually impaired person
- Located at a visible place (not obscured place)
- Well lit bus stop
- Clean bus stop with protection from rain and sun
- Provision of seating facilities
- Protection from weather condition (sun and rain)
- Clear visibility of oncoming buses (not after a bend)
- Help point provision

### 3.1.3 Bus stop approach

Travel from an origin or a destination to a bus stop is the first part of a bus journey. If the approach (including the path leading to bus stop) is unsuitable for older people, they will not be able to access the bus stop and, therefore, use the available bus service. A survey found that road crossings facilities is amongst the main factors deterring older people from using public transport (Marsden et al, 2008). Research carried out by UK DWP (2010) indicated that poor road and footway condition can be a barrier to walking for older people to access bus stops. Crossing a road can be challenging for to older people. In a US survey mentioned by Koffman et al. (2010), 40% of those polled reported inadequate sidewalks in their neighbourhoods, while 55% do not have bike lanes or paths. Also not being able to cross main roads safely is mentioned by 47%. Half of those who reported such problems said they would walk, bicycle, or take the bus more if these problems were fixed. These problems may also exist in Europe and add to the energy needed to travel with public transport.

A comprehensive review of the difficulties faced by older pedestrians was carried out by Dunbar et al (2004). Among the difficulties, sources of high risk for older pedestrians, and where they find it difficult to cross roads, are (UNDP, 2010):

- Crossing busy two-way streets;
- Crossing major roads, particularly with fast traffic;
- Intersections with heavy traffic, particularly where there is no centre refuge;
- Complex situations, where vehicles can come from several directions; and
• Where traffic is allowed to turn across pedestrian routes at light-controlled crossings, or where right turn on red is permitted.

To reduce the difficulties and improve pedestrian safety, measures recommended have included (OECD, 2001):

- Separate the pedestrians from vehicles, for example by providing a sidewalk;
- Pedestrian only areas where possible;
- Reduce traffic volumes, by directing traffic away from areas of high pedestrian activity and from residential areas;
- Reduce traffic speeds;
- Provide pedestrian crossings;
- Provide street lighting;
- Improve infrastructure (Kerb extensions to minimise time on road; Traffic calming to reduce vehicle speeds; Median pedestrian refuges; Adequate footpath widths)

From an older person’s perspective, the bus stop approach should include the following attributes:
- Well maintained footpath leading to a bus stop
- Level or low gradient
- Good crossing facility (Signalled crossing e.g. Puffin, Zebra crossing)
- Traffic (kerbed) island to cross a road in shorter distances
- Lower traffic speed

3.2 Affordability

Affordability is an important issue for many of the older people as they have less disposable income in retirement. Once in retirement, the incomes of most elderly people fall while their expenses remain the same (Age UK, 2010) and therefore, transport becomes less affordable. This finding was supported by a 2006 mobility review, which stated that personnel with lower incomes are less likely to own their own vehicles, and hence have an increased reliance on public transport (Smith et al., 2006). With limited resources, the cost of travelling could be a major barrier for many old people to travel as often as they would like. In extreme cases, some may be unable to access basic and necessary facilities (hospitals, supermarkets, pharmacies, etc.) not otherwise reachable by walking.

There is a need to ensure that older people on low incomes can afford public transport. The public transport cost issue was also highlighted in the report Fair Fares (Help the Aged,
Deliverable 4.1

2003). The cost issue for older people is recognised and concessionary fare schemes are common in many European countries. Subsidisation of public transport, allowing for fare reductions or free access to an assorted range of age categories is the main policy implemented to support older people in their use of public transport.

There are many actions that can be taken by authorities (through public financial support to help meet costs) and transport providers through flexible and creative pricing strategies (concessionary fare schemes, off peak travel prices, etc.) to reduce affordability barriers. Taxis rather than buses, trains or private cars are an alternative mode of travel usually preferred by older people because of mobility or timetable constraints and these are sometimes the only public transport alternative in small towns and rural areas. However, there is evidence that high fares and uncertainties about how much the trip will cost deter potential users (Borges, 2012).

In addition to the affordable issue, flexibility (of using different route/services with the same ticket) is helpful in removing anxiety of older people’s fear of missing the service they require. In the growing use of electronic ticketing systems, the ticket/pass needs to be easy to use. With regards to affordability of public transport, older peoples’ needs can be met by:

- Provision of concessionary fares
- Simple process of obtaining a pass
- Ease of use (showing it to the driver/machine)
- Transferable and flexible tickets
- Simple fare structure
- Pre-paid tickets

### 3.3 Availability

Public transport facilities need to be within the reach of people’s homes and destinations and service times and frequencies need to relate to their way of life. However, the provision of public transport depends on the demand for the service for it to be economically viable. It is difficult to provide a regular/frequent service to an area where the demand is low. In the MiD 2008 study, it was reported that there is an average distance to a bus stop of between 400m and 1km depending on the region of residence. This in turn affects the usage of public transport (GOAL, 2012). Public transport is hardly used in places with less than 2000 inhabitants, whereas in cities with 500000 inhabitants or more, older people use public transport several times a week.
In many rural areas and small towns, it may not be economically viable to provide a ‘normal’ bus service, but demand responsive transport could be a solution to facilitate older people’s travel. In addition, due to the reduced physical ability, special transport services may be required. With regards to availability of public transport, older peoples’ needs are:

- Services connecting residence to place of interest (e.g. shopping centre)
- Frequent bus services
- Longer/appropriate service times
- Demand responsive transport

### 3.4 Acceptability

Older people are sometimes reluctant to take public transport not only because of changes in their physical health, but also especially because of the challenges that public transport poses to them. The SIZE project revealed the following problems: 50% miss toilets in public areas, 40% suffer from negative attitudes towards older people (SIZE, 2003). The report also stressed the importance of recognizing the subjectiveness of barriers to becoming mobile. Older people who have used public transport throughout their lives can more easily cope and are more open to considering the various transport alternatives than those who have always used the car as their main mode of transport. This issue needs to be addressed by public authorities through awareness campaigns. Older people need to know what public transport services are available, their accessibility and areas served. Acceptability covers a wide range of issues including safety, driver attitude (courteous and helpful) and information.

#### 3.4.1 Safety

Safety is a serious concern for older people as they are likely to be more severely injured, take longer to recover and suffer greater psychological impact than a younger person in a similar incident. In many cases, older people worry about their safety and are reluctant to take public transport due to factors such as fear of crime, or falling over and becoming injured. In a study carried out by Marsden G. et al (2007), many of the participants who had fallen on the bus or felt threatened in a certain environment did not use buses again. Fears about personal safety (for example, fear of being a victim of crime or of anti-social behaviour) clearly emerge as an important factor to be addressed (Helped the aged, 2006). In the study, over three-quarters of 31 local authorities identified issues of personal safety (both perceived and actual) as a barrier to travelling. The perception of risk of accidents (trip or falls) is an issue for older people using public transport systems.
An analysis of traffic accidents throughout Europe found that the elderly are more at risk as illustrated in Figure 3.2 (which is a calculation of accident severity rates obtained by dividing the total number of people killed by the total number of accident victims) (ECMT, 2002).

![Figure 3.2: Accident Severity rates (killed x 100 / victims) (Source: ECMT, 2002)](image)

Older people are more frail than younger people. A young person may sustain minor injuries in an accident, but an older person could be fatally or seriously injured in the same situation. This is particularly evident for pedestrian accidents. Approximately 2% of pedestrians aged 20 - 50 years injured in traffic accidents are killed whereas more than 9% of pedestrian accidents are fatal for people aged 80 and over (ECMT, 2002). In all countries the percentage of people killed in recorded serious accidents is highest for the elderly. From an older person’s perspective, safety aspects of public transport include:

- Approaches to bus stop
- Safe crossing
- Bus stop location and facilities
- Priority seats
- Provision of grab rails

3.4.2 Information

The provision of service information is key to encourage public transport use. To be most useful, information needs be clear, concise, accurate and timely. Traveller information is useful for all older people regardless of their physical restrictions. However, the level of usefulness relates to the impairment of the traveller, and some of the information considered
important to one traveller may not be useful for another. Information, especially regarding accessibility of buses (vehicle, bus stop) is crucial to older people with mobility problems. An earlier study suggested that older people find pre-trip information in public transport more important than younger travellers (Grotenhuis et al, 2007).

For an older traveller, a public transport journey involves uncertainty in a more substantial way than for a traveller without functional limitations (Waara, 2009). Targeted traveller information for older traveller could ease some of the uncertainty, worry and stress of public transport travel. For example, Edwards et al (2001) suggested that “an older or disabled traveller may wish to know not only the time that the bus or train will arrive at the appropriate stop, but also whether it will be low-floored and have adequate internal manoeuvring space” (Edwards et. al. 2001). This type of objective information on physical accessibility allows the older or disable traveller to assess the subjective usability (Iwarsson & Ståhl, 2003). Targeted traveller information may thus become very useful for the individual when planning a journey by public transport. The information could be provided addressing various aspects of a travel including (Waara, 2009): general traveller information (necessary for planning a journey but not including terminal/stop or the vehicle), terminal/stop information (accessibility, facilities) and bus (accessibility, ticketing).

Information needs differ from person-to-person depending on their physical abilities. Some older people are capable to getting information using recent technologies (e.g. Smartphone) whereas some rely only on printed information. In addition, after retirement older people have more time than others. Hence the information requirements could be different. For example, SU (2007) found that older people were prepared spend more time on one bus rather than making a journey needing change (even though that may have resulted in a shorter journey time). The information requirements for older people include:
- Provision of visual and audio announcement at bus stop
- Provision of route information displayed at bus stop
- Information with a large font and sufficient details
- Provision of help point
- Easily understandable timetable
- Wheelchair accessibility of a buses on a route

3.4.3 Driver attitude and driving

Driver attitude and driving behaviour could play a key role in older people accepting public transport as a mode of transport. Rickert (2009) pointed out that driving behaviour which
raises safety concerns is a factor preventing many people from using public transport across the world, especially older and disable people. In this regard, a good driver from older people’s perspective should have:
- Good attitudes towards older people
- Driving behaviour (pulling close to the kerb, waits until passengers to sit and smooth acceleration/deceleration)
- Friendly and courteous
- Helpful and informative
- Provide assistance if needed

3.4.4 Transition support

Some older people who have previously relied on their car can find it very difficult to make the transition from driving to using public transport. Activities such as travel training could be useful for these people to make transition to public transport. An overview of improvement wishes for public transport from older car drivers in Germany (Anbindung, 2001) can be seen in Figure 3.3.

![Figure 3.3: Desiderata of older public transport passengers who consider themselves car users (Table from the Anbindung report (2001)).](image)

In this respect, the requirements from older peoples’ perspectives are:
- Provision of information (in suitable form)
- Provision of travel training
- Travel awareness

Based on the discussion above, the general requirements of public transport from older people’s perspectives are summarised in Table 3.1.

**Table 3.1: General requirements of public transport for older people**

<table>
<thead>
<tr>
<th>Issue</th>
<th>Requirements</th>
</tr>
</thead>
</table>
| **Accessibility**| **Bus**  
Kneeling facility  
Handrail  
Priority seating  
Information facility  
Provision of seating facilities  
Wheelchair space |
| **Bus stop**     | Information about bus services (preferably real time information)  
Audible announcement facility for visually impaired person  
Located at a visible place (not obscured place)  
Well lit bus stop  
Clean bus stop with protection from rain and sun  
Provision of seating facilities |
| **Bus stop approach** | Well maintained of footpath leading to a bus stop  
Level or low gradient  
Good crossing facility (Signalled crossing e.g. Puffin, Zebra crossing)  
Traffic (kerbed) island to cross a road in shorter distances  
Lower traffic speed |
| **Affordability**| Provision of concessionary fares  
Simple process of obtaining a pass  
Ease of use (showing it to the driver/machine)  
Transferable and flexible tickets  
Simple fare structure |
| **Availability** | Services connecting residence to place of interest (e.g. shopping centre)  
Demand responsive transport |
| **Acceptability**| **Safety**  
Safe approaches to bus stop  
Safe crossing  
Safe bus stop location  
Priority seats  
 Provision of grab rails |
| **Driver attitude** | Good attitudes towards older people  
Driving behaviour (pulling close to the kerb, waits until passengers to sit and smooth acceleration/deceleration)  
Friendly and courteous  
Helpful and informative  
Assistance if needed |
| **Information**  | Provision of visual and audio announcement at bus stop  
Provision of route information displayed at bus stop  
Information with a large font and sufficient details  
Provision of help point  
 Easily understandable timetable  
Wheelchair accessibility of a buses on a route |
| **Transition support** | Travel information  
Travel training  
Travel awareness |
3.5 Public transport needs of GOAL profiles of older people

GOAL Deliverable 2.1 developed five different profiles on the basis of detailed information from literature, information from Survey of Health, Ageing and Retirement (SHARE) database (Borsch-Supan and Jurges, 2005), information from other surveys such as Keep Moving from the Netherlands, MID from Germany, ISTAT from Italy, feedback from international experts (Workshop) as well as information from two small additional surveys (GOAL, 2012). These five different profiles are:

- Profile 1: Fit as a fiddle
- Profile 2: Hole in the Heart
- Profile 3: Happily Connected
- Profile 4: An oldie but a goodie
- Profile 5: Care-full

These profiles are illustrated in Figure 3.4 and the described subsequently in the context of public transport needs on the basis of fuller description given in Deliverable 2.1 of GOAL project.

![Figure 3.4: Age and activity level of the profiles of older people (GOAL, 2012)](image)

It may be seen in Figure 3.4 that the profiles cover a range of age of older people (from 50 to 100) and activity (from very high to very low activity). The first group *Fit as a Fiddle* can be
described as the youngest and the most active group, while in contrast ‘hole in the heart’ and ‘the Care-Full’ are least active profiles due to their health condition and the age. The public transport use of these profiles varies considerably as discussed below on the basis of Deliverable D2.1 (GOAL, 2012).

3.5.1 Fit as a Fiddle

The younger and fit elderly belong to this group, who do not consider themselves as “old people”. Most are between 50 and 60 and are married or live in a partnership and/or with their children, have excellent physical and mental health and are still employed. The group members have a comparatively high income and are satisfied with their autonomy and quality of life. This group of older people use car as a main mode of transport and rarely use public transport. The lengths and average number of trips does not differ from those of the general population and this group evaluates their mobility opportunities well. This group of older people do not have much problem with technology usage (internet, navigation systems, route planners are used regularly). However, expertise depends on experiences (especially of professional or personal interest). This group of people will use public transport only when they give up driving. Having been dependent on a car for a long time, the transition to public transport could be a challenging. Hence, the main issue of this group of people to use public transport is:

- Acceptability (Transition support)

3.5.2 Hole in the Heart

In spite of their relatively young age (50 to 75), the members of this group suffer from pain and illness and this severely limits their activities. Besides the physical problems, many group members are depressed, have fears and feel lonely. The car is the preferred mode of transport but when they are not able to drive, they use public transport, but generally only if they have previous experiences of using it. Because of their health problems, they make fewer and shorter trips; make more trips to hospitals and medical facilities; and need barrier-free infrastructure. They are dissatisfied with facilities in their neighbourhood / public transport and are afraid of vandalism and crime. The main issues for this group of people are:

- Accessibility (bus, bus stop and approach)
- Acceptability (safety and security)

3.5.3 Happily Connected

This profile is characterised by a very active and social lifestyle. Most of the group members are between 60 and 75, are married or live in a partnership. This group has a very active
social live doing volunteer work, helping friends and neighbours, being members of seniors’ clubs and organisations. Driving is the most important transport mode, where the men are the primary drivers and women are mainly passengers. The usage of technology is high among this profile compared to the other groups, but there are differences within the group, depending on previous experiences from jobs etc. This group of people will use public transport only after giving up driving. Being dependent on the car for a long time, transition to public transport could be a challenging. Hence, the main issue of this group of people to use public transport is:

- Acceptability (Transition support)

### 3.5.4 An Oldie but a Goodie

The members of this group are aged 80 to 90. Most of them are female and are living alone. Despite of their age, they are quite healthy and they are not severely limited in activities. By living alone, they are forced to manage daily life without the support of others. Walking and public transport are their preferred modes of transport as the number of car drivers in this group is low. Members of the Oldie but a Goodie profile avoid technologies and unknown trips if possible. They also avoid extreme weather, long waiting times, special social groups and unknown trips (when possible). The main issues for this group are:

- Accessibility (bus, bus stop and approach)
- Affordability
- Acceptability (safety and security, information)

### 3.5.5 The Care-Full

This is the group of the very old and frail elderly, who suffer from severe physical and mental diseases such as dementia, Alzheimer’s, Senility or Parkinson’s. Eyesight and the hearing are poor. Most members of this group depend on care, assistance and the help of others. The members of this group do not leave their homes very often. When they do so, most of them need assistance from families (lift in cars) or they use special transport services. This group is the highest user of special transport services. They find travelling (especially in public transport) stressful. Try to avoid technologies and use TV, radio. The main issues of this group of people to use public transport are:

- Accessibility (bus, bus stop and approach)
- Availability (Door-to-door service)
3.6 Summary

In this Section, the needs of older people have been reviewed in terms of the main four attributes of older people friendly public transport: accessibility, affordability, availability and acceptability. The public transport needs of older people categorised under GOAL’s profiles have also been reviewed. Based on the review, the main issues of public transport for different GOAL profiles are summarised in Table 3.2.

Table 3.2: Main issues of public transport for different GOAL profiles

<table>
<thead>
<tr>
<th>GOAL profile</th>
<th>Main issue (aspects)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fit as a Fiddle</td>
<td>Acceptability (Transition support, safety and security)</td>
</tr>
<tr>
<td>Hole in the Heart</td>
<td>Accessibility (due to poor health)</td>
</tr>
<tr>
<td></td>
<td>Acceptability (Safety and security, transition support)</td>
</tr>
<tr>
<td>Happily connected</td>
<td>Acceptability (Transition support)</td>
</tr>
<tr>
<td>An Oldie but a Goodie</td>
<td>Accessibility (due to age)</td>
</tr>
<tr>
<td></td>
<td>Affordability</td>
</tr>
<tr>
<td></td>
<td>Acceptability (Safety and security, transition support)</td>
</tr>
<tr>
<td>The Care-Full</td>
<td>Accessibility (due to age)</td>
</tr>
<tr>
<td></td>
<td>Availability (Door-to-door service)</td>
</tr>
</tbody>
</table>
4 Current provision for older people using public transport

Recognising the needs of growing population of older people, various initiatives have been taken at national as well as EU level. Substantial effort has been put to improve accessibility to public transport with European initiatives (EC, 1995). The affordability issue has also been addressed by many European countries in the form of Concessionary fares/Free travel schemes. As a result of these various initiatives, many measures/facilities supporting the use of public transport by older people have been implemented, including the projects listed in Table A3 in Appendix A. These practices vary widely from country-to-country and place-to-place and are described under four main topics: accessibility, affordability, availability, safety and acceptability.

4.1 Accessibility

Recognising the importance of accessibility, various guidelines and best practices have been developed to improve accessibility (e.g. European Bus Directive (EC, 2001), ECMT good practice (ECMT, 2006), TCRP report 82 (TRB, 2002)) and PT Access (2008). These documents cover various aspects of accessibility including bus, bus stop and bus stop approaches.

4.1.1 Bus

In Europe, a substantial effort has been made to improve accessibility to public transport (EC, 1995). In the UK, the regulation made under the Disability Discrimination Act 1995 (UK Parliament, 2010) which is now consolidated in Equality Act 2010 (UK Parliament, 2010) require new buses and coaches to provide improved accessibility for disabled people. In addition to low floor buses, other vehicle design features related to gangways, handrails and other on-board facilities which optimise accessibility, safety and comfort are now clearly established with COST 322 (EC, 1995). The European Framework Directive 2007/46/EC on Vehicle-Type Approval (EC, 2007) makes it mandatory that all new urban buses must ensure accessibility for disabled people. The directive 2001/85/EC of the European Parliament (EC, 2001) and of the Council specifies the requirements for technical devices facilitating access for passengers with reduced mobility (annex VII). In detail the most relevant provisions for this user group are:

- the height of the first step from the ground, and its integration with kneeling systems;
- the number of priority seats and space for passengers with reduced mobility, the free space associate with the priority seat and the ancillary equipment (e.g. armrests, handrails, handholds, and communication devices);
• the pictograms to be used on buses to communicate the presence of a priority seat or of a wheelchair space;
• the floor slope (less than 8%) and prescription to use a non-slippery floor surface;
• wheelchair accommodation provision and restraint systems to be used to guarantee adequate safety levels to their users;
• the maximum height of door controls;
• lighting conditions to illuminate the area inside and immediately outside the vehicle;
• the requirements for boarding aids (i.e. kneeling system, lift and ramp).

The directive constitutes an important step to stimulate a more extensive usage of buses by all users, and especially elderly ones, and is reflected into the current vehicle offer of the five major European OEM (Original Equipment Manufacturer) of buses (MAN, Volvo Buses, Scania, IrisBus and Mercedes-Benz). In 2005, UITP (International Association of Public Transport) performed a survey on several aspects of buses and trolleybuses operated within EU cities with more than 100,000 inhabitants, for a total of 120 million of passengers served. The results relative to accessibility features of class I and II vehicles demonstrated that 68.5% of the buses are low floor (Figure 4.1). More in detail, 54% of the operating buses exceed the low floor specification of the directive (EC, 2001), which defines as low floor a bus with at least 35% of the standing area for passengers without steps and includes access to at least a service door, while 14.5% are low floor according to the EU directive.

![Figure 4.1: Percentage of urban bus/trolleybus with different accessibility levels (UITP, 2005).](image)

The same survey also reported a preliminary result, showing that accessibility levels are usually higher in larger cities (Figure 4.2).
A more in-depth analysis of the current bus offer, based on the OEMs websites, shows a general attention to accessibility, which is reflected in a widespread installation of a kneeling function, as well as a set of different aids to support users with reduced mobility (e.g. space for pram and wheelchair, wheelchair ramp and lift). OEMs have also started to introduce telematics (e.g. MAN, and Volvo), but it is essentially devoted to fleet management and maintenance.

More solutions for accessibility are supplied by third party OEMs as Autoadapt (www.autoadapt.se), Koller (www.koller.co.uk), Q’Straint (www.qstraint.com), Unwin safety systems (www.unwin-safety.com). All these manufacturers target on accessibility for mobility impaired users and thus focus on ramps, lifts and different solutions for restraint systems of wheelchairs. Restraint systems range from the belts attached to the floor and at the bus structure (figure 4.3a), to docking stations for wheelchairs and mobility scooters (figure 4.3b).
Fixing positions can be on rails (figure 4.4), which allow a wider flexibility of internal bus setup, or at fixed locations (figure 4.5).

Figure 4.4: (a) example of floor rails installed on a vehicle; (b) floor rail sample (images from Q'Straint website).

Figure 4.5: (a) example wheelchair attachment points on the floor of a vehicle; (b) floor attachment belt sample for wheelchair (images from Q'Straint website and Unwin Safety Systems catalogue).

The examples show that available solutions on the market consider accessibility to the bus mainly as a problem for mobility impaired users and do not include other kind of impairments. Clever Devices (www.cleverdevices.com) developed a system targeted for a wider set of impaired people. The Bus Stop Announcement with Automatic Voice Announcement (AVA, figure 4.6) automates on-board passenger announcements, which not only keeps passengers up to date, but it also helps to create more accessible buses for visually impaired and hearing challenged users. Automated voice announcements alerting passengers to upcoming stops are coordinated with LED signage on board the bus to help all riders travel with more confidence and independence. The system is fully automated so that bus operators are free to concentrate on driving and other tasks requiring their attention. AVA was designed in order to be fully compliant with the Americans with Disability Act (ADA; www.access-board.gov/adaag/html/adaag.htm), which specifies the technical requirements for accessibility to facilities and services by users with different disabilities. Specifically section 10 of the act is dedicated to transportation facilities.
Figure 4.6: functionalities of the Bus Stop Announcement with Automatic Voice Annunciation (AVA) (images from Clever devices website).

Low floor buses (without steps in the bus) are much more accessible for older and disabled people and have been implemented in Europe since the beginning of 1990s. In addition, the constructing of bus stops with a raised kerb enables entry without steps. In Britain, buses with an accessibility certificate (the DDA PSVAR 2000 Certificate) increased from 29% in 2004/05 to 60% in 2010/11, and a further 25 per cent had low floor access (but no certificate) in 2010/11 (24% in 2004/05) (DfT, 2011). In Dublin, all the buses are planned to be upgraded to have low floor by 2012 within the “Transport for All” project (ptaccess, 2008). Low floor buses are in service almost everywhere in Western and Central Europe including Germany, France and the Netherlands. It is expanding to cities of accession countries including Bucharest (Romania), Budapest (Hungary), Tallinn (Estonia) and Warsaw (Poland) (ptaccess, 2008). In addition to low floor, buses with kneeling facility reduce the height of the access and buses with a provision of ramp to enable wheelchair access to the buses.
Other important features available in these modern buses include spaces for wheelchairs (Figure 4.8a), bright colour contrasting handrails and designated priority seats available for older people (Figure 4.8b). Brightly coloured handrails help people with visual impairment to identify support inside a bus quickly. Designated priority seats for elderly and those with mobility difficulties/disabilities help people to travel comfortably and without the fear of a trip and fall.

The new approach developed for the public transport (PT) system in the “European Bus System of the Future” (EBSF) will impact the future development of buses satisfying the needs of users. In the project, the needs of more than 500 users were collected from all stakeholders of the bus system (regular and non-regular users, operators, authorities, industries, etc.) and translated into targets to be met by the bus system as a whole (ESBF, 2010). Based on these targets different solutions were developed by the manufacturers involved in the project. The new system enables the lateral and the vertical gaps between the
bus and the dock to be bridged, offering optimized accessibility for all passengers. In detail a suspension electronic control fills the vertical gap, while a retractable platform fills the horizontal gap:

- the height regulation system detects the height of the dock thanks to electronic infrared cells placed on the side of the vehicle. The system automatically regulates the vehicle’s height with an automatic suspension system and so places the bus at the same level of the dock. This operation is realized automatically when the vehicle is approaching a bus stop equipped with dedicated transponders based on RFID technology (Radio Frequency Identification);
- the gap filler is a retractable step (Figure 4.9). The system is deployed automatically as soon as the door is open, and retracts once the door is completely closed. The platform is deployed and settled on the dock suppressing the horizontal gap, but only in station and with a vehicle speed zero. The system is linked with a RFID recognition system of the dock for safety with RFID transponder installed in the ground just few meters before the station and RFID reader installed on the vehicle frame.

*Figure 4.9: gap filler solution developed within the EBSF (EBSF, 2011)*

Mercedes-Benz developed a visual system to support the usability of the bus by all passengers, and with a special benefit for visually impaired ones. The bus is fitted with visual interior and exterior elements:

- illuminated coloured (green/red) door frames (LED chains) light up when the bus approaches the bus stop and indicates to passengers at which door they can board the vehicle (figure 4.10a);
a seat occupancy system is introduced in the rear part of the bus which uses coloured lights in the roof paneling above the seats to display whether a seat is occupied (red lamp) or vacant (green lamp) (figure 4.10b).

Figure 4.10: (a) visual system to signal the boarding doors of the bus (b) visual system to signal the free/occupied seats on the bus (EBSF, 2011)

To largely support hearing impaired passengers (but not only them) the bus was equipped with an amplifier automatically adapting the announcement through the interior loudspeakers to the ambient noise level. In addition this demonstrator was fitted with telematics in support of the customer, which included the following:

- WLAN router to ensure free access to the internet;
- a GPS amplifier to allow passengers to localise the bus through their mobile phone application;
- information screens to provide real time interchange information: e.g. the real departure time from the next bus stops, interruptions to services, alternative routes, tourist and public service related information (events, city council announcements, etc.), weather, news and so on.

4.1.2 Bus stop

In addition to the buses themselves, the bus stop is another important factor influencing use. An increased importance is also being placed on making bus stops as accessible as possible. This is emphasised in a 2007 London-based strategy report, which aimed to make 72% of bus stops ‘accessible’ by 2008 (The Mayor of London, 2007). Recognising the importance of bus stops for bus journeys, Transport for London (TfL) developed “Accessible Bus Stop Design Guidance” (TfL, 2006). UNDP (2010) has collated and presented best practices and guidelines to improve the accessibility of bus stops.
4.1.3 Bus stop approach

Access to a bus stop is an essential part of most bus journeys. Measures such as 20mph limits zones in residential areas (included in the DfT’s consultation on the new Road Safety Strategy) benefit the older community. In addition, signalised pedestrian crossing such as Puffin (Pedestrian User-Friendly INtelligent) (DfT, 2001) helps older pedestrians by automatically extending the time available to cross. The importance of the bus stop approach is also recognised in European projects such as KOLLA project in Gothenburg (PT Access, 2008) in which sections of footpaths within a 200m perimeter of Bus/Tram stops were assessed and improved. In Jyvaskyla (Finland), some pavements are equipped with a heating system to melt snow. ECMT (2006) provides guidelines to provide safe, easily accessible footpath for everyone walking or using a wheelchair. The guide also covers other aspects of pedestrian environment such as junctions, pedestrian crossings, use of tactile surfaces, etc. UNDP (2010) also presents best practices and guidelines to improve accessibility of bus stop approach.

4.2 Affordability

The subsidisation of public transport, allowing for fare reductions or free access to an assorted range of age categories is a main policy approach to encourage older people to use public transport. The provision of fare reductions to the elderly is widespread on public transport at both the national as well as the local levels, as shown in Table 3.1. These are provided by national/local governments as well as by operators themselves. The scale and the level of concession provided varies from place to place and from country to country.

In the UK, the free off-peak concessionary bus travel scheme implemented in England provides free local bus travel for people of pensionable age and eligible disabled people, from 9:30am until 11pm on weekdays, all day at weekends and on bank holidays. This is one of the key factors behind the increased use of buses by older people in Britain and the proportion of elderly people applying for concessionary travel passes increased from 49% in 1998/2000 to 58% in 2002 (DfT, 2010b) and to 82% for the 2011/12 year (DfT, 2012). Recent research found that free bus passes encourage older people to be more physically active, whether they are poor or wealthy (BBC, 2012). In Europe, some local authorities offer discretionary concessions over and above the statutory minimum. For example, in the Rhine &Ruhr Area (Germany), the Public Transport Authority provides monthly ticket (“BearTicket”) for frequent users over the age of 60. The ticket is valid during the whole day and entitles the users to take other persons with them during off-peak times. In London, the Freedom Pass (www.tfl.gov.uk/tickets) allows older or disabled people to travel free on all modes of public
transport, including National Rail services. The English National Concessionary Pass allows free travel at any time only on London’s buses.

Table 4.1: National and local fare reduction schemes Table adapted from (Corsi et al, 2010)

<table>
<thead>
<tr>
<th>Country</th>
<th>Provider</th>
<th>Policy description</th>
<th>Target age group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>Railway Federation and other regional public transport companies</td>
<td>50% reduction for an annual fee of €26.90 for all railway connections.</td>
<td>Men above 65 and women above 60 years.</td>
</tr>
<tr>
<td>Belgium</td>
<td>Municipality of Sofia and other big Bulgarian city</td>
<td>Access to buses and trams are free. Reduced-fares are provided outside peak periods on trains.</td>
<td>65 and above</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>Municipality of Sofia and other big Bulgarian city</td>
<td>Preferential fare rates (4 EUR/month for 68+)</td>
<td>Retired and people aged 68 and over</td>
</tr>
<tr>
<td>Spain</td>
<td>Madrid metropolitan region</td>
<td>Reduced fare: €18 yearly card (monthly card for the rest of the population €39.20).</td>
<td>65 and over</td>
</tr>
<tr>
<td>France</td>
<td>SNCF</td>
<td>SNCF one year “card senior” costs €56 gives train ticket reductions from 25% to 50%</td>
<td>Senior aged 60+</td>
</tr>
<tr>
<td>Ireland</td>
<td>Department of Social Protection</td>
<td>The National senior citizens’ free travel scheme is available on all State public transport (bus, rail and Dublin's LUAS service). Free travel is also available on a limited number of services run by private bus transport companies.</td>
<td>66+</td>
</tr>
<tr>
<td>Italy</td>
<td>Many Regions and Municipalities</td>
<td>Favourable rates usually tied to age and income for season tickets for elderly people to be used on public transport</td>
<td>65+</td>
</tr>
<tr>
<td>Lithuania</td>
<td></td>
<td>50% discount on ticket price is valid in all local and national means of transportation (buses, trains and etc)</td>
<td>70+</td>
</tr>
<tr>
<td>Poland</td>
<td></td>
<td>Polish railways 50% price reduction for some train tickets assuming users buy a special pass (currently for PLN 75 or 150, approximately less than € 20 or 40).</td>
<td>60+</td>
</tr>
<tr>
<td>Portugal</td>
<td>Local authorities</td>
<td>Social passes are free of charge during non-peak times, or minimal fee in other schedules. Also train rates are reduced.</td>
<td>Pensioners or 65+</td>
</tr>
<tr>
<td>Sweden</td>
<td></td>
<td>Fare reductions for tickets on buses, both local and national, but not on trains.</td>
<td>Pensioners</td>
</tr>
<tr>
<td>Slovenia</td>
<td></td>
<td>Special discounts for travel with a card. A new card will also introduce additional bonuses and discounts, also by foreign railway companies.</td>
<td>Pensioners</td>
</tr>
<tr>
<td>United</td>
<td></td>
<td>Free bus travel across England at off-peak times and at any time in Wales and Scotland. Free train travel in Northern Ireland.</td>
<td>60+ (England, Wales and Scotland); 65+ in Northern Ireland</td>
</tr>
<tr>
<td>Kingdom</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.3 Availability

Mainstream public transport may not be able to fulfil the travel needs of some passengers even in the case of dense network and accessible services. In some cases, it is difficult to provide bus services due to the low demand. In such cases, supplementary services could be provided to help older people without access to private transport. Examples of such special transport services to older people in the area not served by usual public transport or not been able to access regular public transport include:

- West Yorkshire’s AccessBus (pteg, 2010) provides services for people who are unable to easily use conventional buses to local supermarkets or shopping centres. All new AccessBuses ‘kneel’ and have ramps, extra space for shopping bags and are narrower and shorter to enable them to get down residential streets to pick-up and drop-off passengers.

- Tyne and Wear’s ‘Nexus’, provide weekly shopper services for five residential homes for the elderly in North Tyneside. It takes residents direct from their homes to local shopping centres, picking them up later in the day. The service utilises school transport vehicles that would otherwise remain unused during the day.

- Lincolnshire’s CallConnect forms part of the Interconnect bus network and is a public bus service that operates only in response to a pre-booked request (on a ‘dial a bus’ basis). In most cases CallConnect will pick up and set down at designated locations in each village or town. Passengers with a disability or those living in more isolated can be picked up and returned to their home address, if it is safe and practical to do so. A similar scheme is being explored by GMPTE in the Greater Manchester to provide effective integrated demand responsive transport.

- Shopmobility can offer connection between shopping centres and PT stops using various mobility aids including electric scooters, walking frames, etc. The information on the type/location of Shopmobility schemes that exist around the country to help people with mobility problems shop and use the local area’s facilities is given in its website.

- In the town of Fondettes (France) a dedicated service has been implemented for senior aged 65 and over: a taxi service at one euro per trip. Similarly, in the city of Toulouse, a taxi bike for seniors has been introduced at the cost of 5 euros per month for people aged 60 and over.

- Weekly bus service to rural areas in Estonia, collective taxi service in Spain, subsidised taxi service in France and special transport provision for elderly in Sweden (Corsi et al, 2010).
In Northern Ireland, The Transport Programme for People with Disabilities (TPPD) has developed a number of specialised transport services for older people and disabled people such as Door-2-Door Transport, Easibus and Shopmobility.

4.4 Acceptability

4.4.1 Safety

Older people are more vulnerable than other passengers. They are often afraid of crime and victimisation in the public transport and on the access routes. Some of their fear is real and some is perceived. Such perceived fear could be addressed by travel training schemes which can help install the confidence and skills in individuals needed to travel on public transport. This may be particularly important for older people who have given up driving due to health reasons and are embarking on the use of public transport for the first time or following a long period of absence. Good examples in this area include:

- UK DfT published a good practice good for travel training (Travel training scheme good practice guide, 2011) based on the review of travel training schemes in the UK (Travel training scheme review, 2007).
- Similar training sessions to learn how to enter the bus, how to stand safely inside the vehicle or how to get seated easily have been run in different cities of Europe including Salzburg, Berlin, Barcelona, Frankfurt and Hanover (ptaccess, 2008). In parallel, training sessions were provided to the drivers to make them aware of the mobility issues of older people and how to drive safely (EMTA, 2007).
- In Leeds, a “Bus Buddying” scheme provides one-to-one support to people with physical and sensory impairments and others who lack the confidence to use public transport (ptaccess, 2008).
- In Lille (EMTA, 2007), about 400 “friendly agents” in Lille’s public transport network helped old people to get correct timetable, to find correct bus stops, etc. Evaluation of the security scheme showed that particularly elderly passengers welcome the security agents.
- The CityBee scheme in Barcelona (ptaccess, 2008) used a wireless network to localise and rescue vulnerable persons using a specially designed mobile device in urban areas.
- There are examples of safe journey cards explaining how to make a safe bus journey designed for older people (http://www.firstgroup.com/safejourney).
4.4.2 Information

There are various ways of providing information including: booklets/leaflets, information at bus stops, internet and phone. However, only a few of such facilities are focussed on older people, and information provision is not consistent across UK and Europe. These various forms of information provision adopted include:

- **Booklets:** Printed booklets with information about the bus services in an area are common across Europe. This is a conventional and very useful form of information for older people who do not use latest technology (e.g. mobile phone, smart phone).

- **Real time information at bus stops:** Real time information at bus stops is implemented in many places across Europe. The system is helpful in removing the uncertainty of bus arrival times. From older people’s perspective, it is important that speed of change (of variable message) should not be too fast otherwise people who can read, but not well, will find it difficult to understand the message. ECMT (2006) good practice guide for improving transport accessibility for all recommended that a line of text should be displayed for at least ten seconds, preferably a little longer. The Swiss Federal Office of Transport has produced a comprehensive report (in German) on the readability of dynamic visual information for visually impaired people (ECMT, 2006).

- For visually impaired people, talking bus stops can provide real time passenger information. A battery-operated key fob is used to alerts them when they are near one of the talking bus stops. The bus stop gives them details of which services are due. In the Europe, many cities including London, Brighton, Leicester (UK), Munster (Germany) have provided talking bus stops at many locations. However, there seems to be no national or European level strategy on this measure.

- **On board information:** Announcements help people with visual impairment and the visual display helps those with hearing difficulties. In the UK, some regions have bus services with a provision of “Next bus stop” announcement and display on board (e.g. iBus London). DfT is currently researching audio visual announcements on buses - which can assist in making journeys easier for older (and disabled people). Information can also be available by telephone using automated voice systems (West Yorkshire’s Metro), in addition to the current SMS, web and WAP services.

- **Talking signs:** In Newcastle, City Council has introduced talking signs using technology to assist blind and partially sighted people to get around. Speakers mounted to signs, lamp posts or walls contain recorded messages that, when activated by an electronic fob in range, tells the person carrying the fob their location and what is to their left and right.
Similarly, wayfinder/talking signs are installed throughout Birmingham for the visually impaired

- **Web**: There are dedicated sites like Transport Direct which provides door-to-door journey plans and travel information for different transport modes, finding places and live travel news across Britain. In addition, the information is also available via TV channels aimed at those do not have computer access/skill.

- **Handheld devices**: There are several solutions currently offered commercially to provide real time information of bus services on handheld devices (Figure 4.11). Such services can also implement on-demand or subscription-based email and text-message alerts, including notices of service interruptions, emergencies, and other important events.

![Figure 4.11: example of real time information (a) on handheld device and (b) on infotainment solution (images from Clever Devices website).](image)

- In the EBSF project, the Majadahonda-Madrid corridor in Madrid (served both by bus and by train) was equipped with a multi-modal and real time information system to communicate with users via various means (web, SMS, displays, Bluetooth, etc.). The objective was to enable customers to decide in every moment of their trip the best modal solution to complete the journey in the shortest time taking account of possible congestions or disruptions of the services. Information was delivered ubiquitously along the corridor, on board the vehicles, at stops and at interchange stations, via SMS messaging or via the web, Bluetooth, displays, etc. Such application could be developed to provide information to older people by addressing their specific requirements.

- **Travel guide**: Almost all European cities including London (UK) and Stuttgart (Germany) produce guides of accessibility information for all public transport stops. The London guide provides information about the facilities available at different public transport stations (Figure 4.12). Centro’s ‘Getting Around Access Guide’ (Centro, 2008) provides a
comprehensive guide to accessible public transport in the West Midlands. Information in
the guide includes where wheelchair spaces are likely to be found on the bus, how to
board safely and even where the handrails are likely to be.

![Image of London’s travel guide with information about station facilities](image)

**Figure 4.12**: London’s travel guide with information about station facilities

### 4.4.3 Driver attitude and driving

Despite having facilities to help, drivers are sometimes reluctant to help those in need
due to poor training/attitudes. In the UK, the *Conduct of Drivers, Inspectors, Conductors
and Passengers Regulations* imposes a duty on coach and bus staff regarding the safe
carriage of disabled passengers. The Driver Certificate of Professional Competence
(DriverCPC) is an initial qualification for drivers entering the bus industry which they must
complete in order to drive professionally. Even then, RADAR (organisation for people
with disabilities) highlighted that sometimes drivers do not lower a kneeling bus, or not
pull close enough to the kerb. The World Bank’s Disability and Development Team have
developed a pocket size guide for bus drivers with regard to older passengers and
passengers with disabilities (Rickert, 2009). The guide lists some of the more important
essentials of safe and accessible driving. An example of such a guide is shown in Figure
4.13.

![Model pocket-size guide for bus drivers](image)

**Figure 4.13**: A model pocket-size guides for bus drivers (Rickert, 2009)
4.4.4 Other measures

Blind or partially sighted people can have difficulty distinguishing a bus from a van or car. In such cases, a high visibility bus hailer enables users at bus stop to show the service number they want to catch. For example, Centro has produced an A5 flip pad (Figure 4.14a) with large, black tactile numbers with Braille on a bright yellow background (pteg, 2010). Similarly, Centro (in UK) has produced a note pad (Figure 4.14b) to help people with communication difficulties to buy tickets on buses or for train journeys. The pad contains 50 tear-off slips, each of which states that the bearer may have a speech or hearing impairment and also indicates where they want to go. The user completes the slip with the required ticket information, and hands it to the person selling the ticket. Assistance cards (Figure 4.14c) are small cards designed to help disabled people to use public transport. In the UK, Centro’s card can be torn-off and placed with a bus ticket and/or concessionary pass holder. The cards have messages like: “Please speak slowly, I am hard of hearing”, “Please be patient, I have difficulty in speaking” and “Please wait for me to sit down”.

![Figure 4.14: Passengers with high visibility Bus Hailers (pteg, 2010)(a), Tickets please pad (b) and assistance card (Centro, 2010)(C)](image)

Activities such as mobility days help to improve the image/profile and raise awareness of public transport. Mobility days for older people include: exhibition of products related to the mobility of older people; presentations, brochures and guided tours of public transport; and exchange of views between older people and staff. The “Mobility day” event in Salzburg (Austria) is an example of such scheme.

When older people appreciate that their suggestions and complaints are taken seriously, their levels of satisfaction and the image of public transport improves. One such example is
the ombudsman for passengers in Salzburg (Austria) in which a dedicated contact (Named person) receives the suggestions and complaints of older people. Centro, the West Midland Public Transport Authority has started to cooperate with local communities to understand the mobility needs and issues of older people with migratory backgrounds.

4.5 Summary

The needs of the growing number of older people are addressed or recognised in many national and EU level policies. This has resulted in a number of good practices/provisions for older people using public transport. The current provisions for older people using public transport is summarised in Table 4.2.

Table 4.2: Summary of current provision for older people using public transport

<table>
<thead>
<tr>
<th>Issue</th>
<th>Current provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessibility</td>
<td><strong>Bus</strong>&lt;br&gt;Accessible buses with facilities needed for elderly are available in many European cities&lt;br&gt;Best practice guidelines are available</td>
</tr>
<tr>
<td>Bus stop</td>
<td><strong>Examples of bus stops addressing older people’s need are available in many European cities&lt;br&gt;Best practice guidelines are available</strong></td>
</tr>
<tr>
<td>Bus stop approach</td>
<td><strong>Examples of schemes addressing older people’s need of bus stop approach are available in some European cities&lt;br&gt;Best practice guidelines are available</strong></td>
</tr>
<tr>
<td>Affordability</td>
<td><strong>Provision of concessionary fares (in the UK and Europe)</strong></td>
</tr>
<tr>
<td>Availability</td>
<td><strong>Examples of various services addressing the needs of older people in urban as well as rural areas (e.g. travel training)</strong></td>
</tr>
<tr>
<td>Acceptability</td>
<td><strong>Safety</strong>&lt;br&gt;Examples of measures to improve safety of older people using public transport are available</td>
</tr>
<tr>
<td>Driver attitude</td>
<td><strong>Driver attitudes towards older people&lt;br&gt;Driving behaviour</strong></td>
</tr>
<tr>
<td>Information</td>
<td><strong>Provision of information in various forms (booklet, internet, at bus stop, in-vehicle)&lt;br&gt;Measures to address the need of visually impaired are available in some places</strong></td>
</tr>
<tr>
<td>Others</td>
<td><strong>Measures such as bus hailer cards, assistance card are is use in some European countries&lt;br&gt;Mobility day</strong></td>
</tr>
</tbody>
</table>
5 Holistic approach to public transport needs

5.1 Introduction

The research findings identified in the previous Sections can be considered as part of an holistic approach. An outline of a model to describe such an approach is described in this section. This is in line with a recent European project “European Bus System of the Future” (www.ebsf.eu), which mobilized the majority of European stakeholders in bus public transport to develop a new holistic approach to overcome fragmentation across Europe and to introduce “a new level of urban bus transport that will lead to a new generation of bus systems that are adapted to European cities.” (EBSF, 2009).

The selection of public transport for a trip by an elderly passenger depends on a decision making processes that involves a complete picture of the journey. As Fielder (2007) states: "Unlike truly impaired passengers, there are less particular barriers for many older passengers. It is much more the sum of constraints and efforts on the whole trip that is crucial". Therefore, research needs to be aimed at the complete experience. This section introduces a model that describes this complete experience and should help to gain more insight in the factors leading to the decision for or against using public transport and how to create the optimal setting for public transport usage by elderly. As such, it provides a framework and content to understand future research needs.

5.2 Decision based model of public transport usage

The model with the elements playing a role in the decision making process is shown in Figure 5.1.
Figure 5.1: decision based model of public transport usage (Source: TNO)

All travel starts with a desire or need to travel which may come from both intrinsic (want to go to a concert) and extrinsic drivers (need to visit the hospital). On different levels of consciousness the choice is made to travel or not, and by which means of transport. A mental model of the complete trip and the cost involved lies at the basis of the decision. The mental model is updated from travel experiences. One bad experience can dramatically influence the model and, therefore, future decisions. Because the elderly are less resilient, this may be even more true for them than for other users. The travel experience goes beyond the actual experience of public transport and involves the entire trip from door to door.

5.3 Model elements

5.3.1 Drivers, leading to need / desire for mobility

Although furthest away from the actual usage of public transport, knowing the drivers for travel will help to define service needs, as these drivers will influence e.g. destination, trip duration and travelling time of day.
5.3.2 Mental model of trip

Behaviour is based on the interpretation of facts not on the objective facts themselves. The mental model represents how the elderly traveller views the trip ahead. This may not coincide with the actual travel conditions as it is based on both factual trip characteristics influenced by the following factors:

- prior experience: this is based not only on actual trips but is more likely to cover the complete trip from door-to-door. In the absence of a prior experience, other factors play an important role.
- knowledge of the trip ahead. For public transport this involves everything from ticketing to timetables. Especially the older passenger will want to know as precisely as possible what to expect. This may be one of the reasons why the elderly shouldn't be expected to become first time PT-users once they are no longer "fit as a fiddle"
- attitude towards public transport is another important factor. Research shows that getting car users to leave the car and make the transfer to public transport, is very difficult (Steg, 2003). However, if attitudes towards a transport mode is an important factor, it will be important to address any prejudice the elderly might have against public transport. Further, attempts can be made to influence the mental model of other transport modes, e.g. the car is dangerous, bad for the environment (Elias&Shiftan, 2012, Steg, 2003)

5.3.3 Cost-benefit analysis

Based on the mental model, the trip is valued. Is it worth the combination of time, money and energy the passenger expects to invest in the trip? This is hard to predict as it has a highly personal element: it also depends on the available time, money and energy and on the strength of the need or desire to travel. Energy relates to the amount of effort the elderly need to fulfil the trip. This is not just physical. Being afraid not to be able to get back in time or having to endure crowded smelly waiting places also demands energy from the elderly. According to Fiedler (2007) the issue of physical stress is often undervalued. Travelling is much more exhausting for the elderly who could chose not to make a trip by public transport because he or she has to change vehicles. Age comes with reduced capabilities on many levels, so it is obvious that travelling becomes relatively more demanding.

Value marketing (Litman, 2008) might provide a valuable source of knowledge to understand the decisions made by the elderly in a given transport environment. In value marketing, every aspect of the travel ("soft" and "hard" factors) is expressed in travel time cost units, a value users assign to their travel time (depending on the currency it is measured in e.g. cents per
minute or euros per hour). A table of factors affecting travel time cost units. Qualitative factors such as travel convenience, comfort, and security affect travel time unit costs is shown in Figure 5.2 from Litman (2008). Various studies mentioned by Litman (2008) indicate that inconvenience and discomfort often double or triple average travel time costs. This has important implications for transportation planning since travel time costs are a major factor in transport project evaluation.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Description</th>
<th>Transit Evaluation Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waiting</td>
<td>Waiting time is usually valued higher than in-vehicle travel time.</td>
<td>Transit travel usually requires more waiting, often along busy roads, with little protection.</td>
</tr>
<tr>
<td>Walking links</td>
<td>Time spent walking to vehicles is usually valued higher than in-vehicle travel time.</td>
<td>Transit travel usually requires more walking for access.</td>
</tr>
<tr>
<td>Transfers</td>
<td>Transfers impose a time cost penalty.</td>
<td>Transit travel often requires transfers.</td>
</tr>
<tr>
<td>Trip duration</td>
<td>Unit costs tend to increase for trips that exceed about 40 minutes.</td>
<td>Transit travel tends to require more time than automobile travel for a given distance.</td>
</tr>
<tr>
<td>Unreliability (travel time variance)</td>
<td>Unreliability, particularly unexpected delays, increase travel time costs.</td>
<td>Varies. Transit is often less reliable, except where given priority in traffic.</td>
</tr>
<tr>
<td>Waiting and vehicle environments</td>
<td>Uncomfortable conditions (crowded, dirty, insecure, cold, etc.) increase costs.</td>
<td>Transit travel is often less comfortable than private vehicle travel.</td>
</tr>
<tr>
<td>Sense of control</td>
<td>A person’s inability to control their environment tends to increase costs.</td>
<td>Transit travel is often perceived as providing little user control.</td>
</tr>
<tr>
<td>Cognitive effort (need to pay attention)</td>
<td>More cognitive effort increases travel time costs.</td>
<td>Varies. Driving generally requires more effort, particularly in congestion.</td>
</tr>
<tr>
<td>Variability</td>
<td>Transit travel conditions are extremely variable, depending on the quality of walking, waiting, and vehicle conditions.</td>
<td>Transit benefit analysis is very sensitive to qualitative factors that currently tend to be overlooked and undervalued.</td>
</tr>
<tr>
<td>Captive vs. discretionary travelers</td>
<td>Some transit users are captive and so relatively insensitive to convenience and comfort, but discretionary travelers tend to be very sensitive to these factors.</td>
<td>Achieving automobile-to-transit mode shifts requires comprehensive analysis to identify service quality factors that attract discretionary travelers.</td>
</tr>
</tbody>
</table>

Figure 5.2: Factors affecting travel time unit costs (Litman, 2008)

Apart from evaluating their own costs, an elderly person planning a trip might also consider other costs such as, those for the environment (when taking the car is considered) or the associated costs incurred by other people. For example, it is quite possible for someone wanting to remain independent to consider, for example, whether the trip is worth having to ask the help of service personnel at the railway station. For some, having to ask for a specific type of service can be a huge barrier.

5.3.4 Actual trip experience: what is there, how is it experienced

Once the decision has been made, the next stage in the model is the actual trip which leads to a door-to-door trip experience which is evaluated. Fiedler (2007) stresses that "the requirements and aspirations of older people go far beyond the classical accessibility
context… In consequence, it will be difficult to meet the future challenged with (rather technical) accessibility guidelines. Thus, integrated concepts are necessary”. As stated before, perception plays an important role. It is the main driver of behaviour and therefore is at the basis for future travel planning. Insight as to how trips are perceived is only possible by consulting the user and a participatory approach in public transport and urban planning is vital. In general the following aspects of the trip can be distinguished:

- trip preparation, which involves trip planning and sometimes acquiring tickets
- getting to and from public transport / transit in public areas
- using public transport, including waiting facilities

**Trip preparation**

For many travellers trip preparation is important, because of trip duration, infrequent operating times, distances to public transport and mode changes. For the senior citizen this is even more important because of their reduced resilience. More than other passengers the elderly might want to know exactly what lies ahead to be able to feel in control. This aspect poses a challenge to the older passenger wanting to feel in control because it is essentially in conflict with the use of public transport which requires handing over control to the operator. Whilst most travel information can be found on the internet, this rarely covers the whole trip, and the elderly might want to know more, e.g. where toilets can be found along the route. Also, the elderly may not have access to the internet or feel comfortable with its use.

**Getting to and from public transport: mobility in public areas**

Getting to and from public transport stops may form an important barrier for the elderly with reduced mobility. In several countries door-to-door services are provided to solve these issues. However, even in these cases of specific transport services, the elderly report a lack of adequacy between the proposed services and the needs of people, ranging from lack of training of staff, to limitation in the use of the vehicles and to cost issues (AGE, 2002).

Of the personal reasons for not leaving home, emotions such as the fear of becoming the victim of a crime as well as physical restraints are relevant. Such emotions can form severe subjective barriers to mobility. Distances to public transport may be short in urban areas. However, in suburban and rural areas these distances may themselves be a barrier which cannot be overcome by the elderly traveller alone.

**Using public transport**

When using public transport, the following aspects play a role in the ride experience and the overall level of satisfaction:
• schedule information
• ticketing
• accessibility
  o waiting facilities
  o distances and 'barriers'
  o boarding and alighting
  o seat availability
• seating
  o availability
  o ingress/egress
  o seat comfort
• on board facilities
• ride comfort
• fellow passengers
• service personnel: availability and behaviour

As described earlier, much research has been undertaken on how to make public transport more attractive to all users and increasingly users are involved in the research. This is important especially from the perspective of the older user. Of the elderly who do not participate in leisure activities because of public transport issues, a quarter of respondents mention difficult schedules and ticketing machines as a cause. For example, getting a new chip card ticketing system ready for use is complex in the Netherlands, even for younger passengers.

**Time, energy & discomfort, money**

When evaluating the trip experience from a research point of view, it is not enough to obtain insight into actual costs (time, money or energy). It is important to find out how time, trip costs, energy and discomfort as a total were perceived and valued. How these relate to what was expected might also be added.

**5.3.5 User characteristics**

Lastly, characteristics of the user and his or her situational setting should serve as input for the model. These characteristics may strongly define the outcome of the decision making process. The GOAL profiles (GOAL, 2012) can be used to characterise the public transport user. However, they may not distinguish user characteristics sufficiently finely. Equally important is the situational setting as levels of public transport provision generally differ
Deliverable 4.1

strongly between urban, sub-urban and rural settings. User expectations may currently differ substantially across Europe and, whilst the actual needs should be similar, the emphasis from user surveys may reflect existing conditions rather than long term requirements.

5.4 How to use the model

In general, the model can be used to have a clear view of the many aspects that are involved in public transport usage by the elderly and disabled. As such it forms a background to defining research needs.

Because the model is largely oriented around the decision to use or not to use public transport and how it is experienced, it is vital that the user is involved. This goes beyond surveying the user or even the non-user. Fiedler (2007) mentions several examples of successful participatory approaches in which the older users are seen as partners in public transport improvement processes, such as tours with different focus groups (among which older people) who explain their mobility issues to transport planners. The model will help in e.g. constructing better questionnaires and should help to gain more insight in the decisive factors for or against using public transport for travel.

The model also shows that when wanting to promote the use of public transport by the elderly, more parties are involved than public transport companies, which obviously makes it much more difficult to coordinate actions leading to improved mobility. Research might help to gain insight in how to best influence the decision making process is such complex situations. Lastly the model could serve to create a standardised approach to evaluate different travel scenarios in a specific environment i.e. providing a benchmark.
6 Analysis of needs and current provision

6.1 Analysis of issues of different GOAL profiles

The previous Sections have discussed the public transport needs of different profiles of older people developed in this GOAL project, current provision available and an holistic approach. This section analyses the issues of different GOAL profiles for using public transport with the current provision to identify knowledge gaps. The analysis of the issues, current provisions and research needs for each GOAL profile are described in the subsequent sub-sections by taking an example of the person representing the profile.

6.1.1 Fit as a fiddle

The analysis is carried out on the basis of a typical person with following characteristics representing the profile:
- A person on his/her mid 50s
- Still on the job and financially sound
- Owns a car and use for daily purpose
- Occasional user of public transport

For such person, accessibility, affordability and availability are not issues at present. However, if the disposable income is reduced and fares increased, there could be potential affordability issue. There is a little knowledge about the behaviour (what one would do) in such situations. Having used car as the main mode of transport, this person uses public transport very little and finds it quite difficult to make transition to public transport. There is a very little knowledge about the various causes of transition and the best way of supporting the transition to public transport (depending on the causes of transition). Some have a high perceived risk of using public transport and this and factors need further exploration. This person is mostly able to use recent technologies and these (e.g. smartphone apps) could be useful in providing public transport information. Despite having a big pool of smartphone applications, a knowledge gap exists about the requirements of such applications from the prospect of older people (of this profile). The summary of various issues of this profile along with present knowledge, current provision and knowledge gap is given in Table 6.1.
Table 6.1: Analysis of the issues of Fit as a fiddle using public transport

<table>
<thead>
<tr>
<th>Issue</th>
<th>Present knowledge</th>
<th>Current provision</th>
<th>Knowledge gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessibility</td>
<td>Not a current issue</td>
<td>No special provision for this group</td>
<td>Not likely to be a future issue unless service provision is reduced</td>
</tr>
<tr>
<td>Affordability</td>
<td>Not a current issue</td>
<td>No special provision for this group</td>
<td>Effect of reduced disposable incomes and increased fares not known</td>
</tr>
<tr>
<td>Availability</td>
<td>Not an current issue</td>
<td>No special provision for this group</td>
<td>Not likely to be an issue</td>
</tr>
<tr>
<td>Safety</td>
<td>Perceived risk of using public transport</td>
<td>No special provision for this group</td>
<td>Factors affecting perceived risk of taking public transport</td>
</tr>
<tr>
<td>Driver attitude</td>
<td>Not a real issue</td>
<td>No special provision for this group</td>
<td>Best way of influencing good driver attitude/behaviour</td>
</tr>
<tr>
<td>Information</td>
<td>Technology user</td>
<td>Smartphone based real time info available</td>
<td>Requirements of smartphone apps for older people</td>
</tr>
<tr>
<td>Transition support</td>
<td>Not familiar PT user</td>
<td>Travel training best practices available</td>
<td>Causes of transitions and best way to support</td>
</tr>
</tbody>
</table>

6.1.2 Hole in the Heart

The analysis for this profile of older people is carried out by taking a typical person with following characteristics as an example:
- A person on his/her early 60s
- Significant heart problem needing him to make regular hospital visits
- Unable to drive and uses public transport to go to hospital
- Mentally agile but physically weak (difficult to walk more than 200m)

Poor health means the accessibility is an issue for this person and especially the distance to the bus stop and the condition of the pavement could be critical. Accessibility of a public transport could be improved based on the various best practices and guidelines available. However, economic justification is normally needed for implementation. For this, there is an insufficient knowledge about the economic benefits of the quality of life experienced by the older people as a result. Despite not being keen public transport user, transition from car to public transport could be sudden for this person. As in the earlier profile, there is a very little knowledge about the various causes of transition and the best way to support the transition to public transport. The reluctance of the person public transport is compounded by his/her safety concerns. Some of these concerns could be real and others are perceived only. There is a very little knowledge
Deliverable 4.1

about the real and perceived risks of using public transport and the ways of mitigating them. The driver attitude could be an issue for this person. Good driving behaviour could be influenced by implementing measures such as monitoring, policing and controlling. A thorough research is needed to identify the best measure to do so. The summary of various issues of this profile along with present knowledge, current provision and knowledge gap is given in Table 6.2.

Table 6.2: Analysis of the issues of Hole in the Heart using public transport

<table>
<thead>
<tr>
<th>Issue</th>
<th>Present knowledge</th>
<th>Current provision</th>
<th>Knowledge gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessibility</td>
<td>Health related issues</td>
<td>Best practices and guidelines available</td>
<td>Methodology of assessing benefits from accessibility measures</td>
</tr>
<tr>
<td>Affordability</td>
<td>Not a current issue</td>
<td>No special provision for this group</td>
<td>Effect of reduced disposable incomes and increased fares not known</td>
</tr>
<tr>
<td>Availability</td>
<td>Not a current issue</td>
<td>No special provision for this group</td>
<td>Not likely to be an issue</td>
</tr>
<tr>
<td>Safety</td>
<td>Perceived risk of taking public transport</td>
<td>No special provision for this group</td>
<td>Factors affecting perceived risk of taking public transport</td>
</tr>
<tr>
<td>Driver attitude</td>
<td>Could be an issue</td>
<td>No special provision for this group</td>
<td>Best way of influencing good driver attitude/behaviour</td>
</tr>
<tr>
<td>Information</td>
<td>Not an issue</td>
<td>No special provision for this group</td>
<td>Effect of real time information in removing anxiety</td>
</tr>
<tr>
<td>Transition point</td>
<td>Not keen PT user</td>
<td>Travel training best practices available</td>
<td>Causes of transitions and best way to support</td>
</tr>
</tbody>
</table>

6.1.3 Happily Connected

The analysis for this profile of older people is carried out by taking a typical person with following characteristics as an example:
- A person on his/her late 60s
- Just retired and financially sound
- Very active and social lifestyle
- Owns a car and use for daily purpose
- Started to find driving problematic (e.g. congestion, navigation, parking)
- Occasional user of public transport

Accessibility, affordability and availability for using public transport are not current issues for this person. The knowledge gaps in these areas are similar to that to ‘Fit as a Fiddle’ profile. However, perceived risks of using public transport may put the person off using it.
Since, the person is not a regular public transport users, a help to make a transition from private car to public transport is crucial for him/her. In this respect, research is needed to develop methodology to develop targeted intervention based on the prior experience of a person making such transition to public transport. This could be supported by a user friendly information medium (e.g. smartphone applications) the person are technology user. There is a knowledge gap about the support needed for different groups of people to make transition to public transport. The gap in knowledge also exists on the requirements of mobile applications from the prospect of the person. The summary of various issues of this profile along with present knowledge, current provision and knowledge gap is given in Table 6.3.

Table 6.3: Analysis of the issues of Happily Connected using public transport

<table>
<thead>
<tr>
<th>Issue</th>
<th>Present knowledge</th>
<th>Current provision</th>
<th>Knowledge gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessibility</td>
<td>Not an issue</td>
<td>No special provision for this group</td>
<td>Not likely to be a future issue unless service provision is reduced</td>
</tr>
<tr>
<td>Affordability</td>
<td>Not an issue</td>
<td>No special provision for this group</td>
<td>Effect of reduced disposable incomes and increased fares not known</td>
</tr>
<tr>
<td>Availability</td>
<td>Not an issue</td>
<td>No special provision for this group</td>
<td>Not likely to be an issue</td>
</tr>
<tr>
<td>Safety</td>
<td>Perceived risk of taking public transport</td>
<td>No special provision for this group</td>
<td>Factors affecting perceived risk of taking public transport</td>
</tr>
<tr>
<td>Driver attitude</td>
<td>Not an issue</td>
<td>No special provision for this group</td>
<td>Best way of influencing good driver attitude/behaviour</td>
</tr>
<tr>
<td>Information</td>
<td>Technology user</td>
<td>Smartphone based real time info available</td>
<td>Requirements of smartphone apps for older people</td>
</tr>
<tr>
<td>Transition point</td>
<td>Not familiar PT user</td>
<td>Travel training best practices available</td>
<td>Causes of transitions and best way to support</td>
</tr>
</tbody>
</table>

6.1.4 An Oldie but a Goodie

The analysis for this profile of older people is carried out by taking a typical person with following characteristics as an example:
- A person on his/her early 80s
- Mentally agile but physically weak
- Uses public transport for most of the journeys
With the age, the person has issues with the accessibility of buses, bus stop and approaches to the bus stop. The literature review (Section 4) showed that different best practice examples and various guidelines for implementing accessible facilities are available. However, there is not enough knowledge about the economic benefits of the quality of life experienced by the older people with accessible transport measures. Such methodology of assessing economic benefits would be very useful in justifying the implementation of accessibility measures. Another major issue for this person is the safety concerns (actual and perceived) of using public transport. There are good practices available to reduce such safety concerns (e.g. travel training). However, as mentioned earlier, a knowledge gap exists on the level of perceived and actual safety concern of older people. The driver attitude could make a big difference to the person. As mentioned earlier, there is a scope for a research to identify the best measure to influence good driver attitude (e.g. monitoring, policing, controlling). The person is not a user of new technology, information is needed in terms of the simple and common format such as booklet, phone and radio. Further research could be carried out to develop a best way of providing information to older people using such common technologies. The summary of various issues of this profile along with present knowledge, current provision and knowledge gap is given in Table 6.4.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Present knowledge</th>
<th>Current provision</th>
<th>Knowledge gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessibility</td>
<td>Age related issues</td>
<td>Best practices and guidelines available</td>
<td>Methodology of assessing benefits from accessibility measures</td>
</tr>
<tr>
<td>Affordability</td>
<td>Is an issue</td>
<td>Best practices available</td>
<td>Methodology of affordability benefits from accessibility measures</td>
</tr>
<tr>
<td>Availability</td>
<td>Not an issue</td>
<td>No special provision for this group</td>
<td></td>
</tr>
<tr>
<td>Safety</td>
<td>Perceived risk of taking public transport</td>
<td>No special provision for this group</td>
<td>Factors affecting perceived risk of taking public transport</td>
</tr>
<tr>
<td>Driver attitude</td>
<td>Could be an issue</td>
<td>No special provision for this group</td>
<td>Best way of influencing good driver attitude/behaviour</td>
</tr>
<tr>
<td>Information</td>
<td>Not a technology user</td>
<td>Printed booklets, phone, Radio and TV information</td>
<td>Way of providing public transport information using common technologies</td>
</tr>
<tr>
<td>Transition point</td>
<td>Not an issue</td>
<td>No special provision for this group</td>
<td>Not likely to be an issue</td>
</tr>
</tbody>
</table>
6.1.5 The Care-Full

The analysis for this profile of older people is carried out by taking a typical person with following characteristics as an example:
- A person on his/her early 90s
- Frail health condition - physically and mentally weak
- Unable to drive and need assistance to travel

For this person, accessibility and availability are the main issues. As the person may not be able to use mainstream public transport, special transport services (e.g. demand responsive, shared taxi) may be needed to travel around. There are best practices of such services available in many European countries (Section 4). However, in this tight economic climate, economic justification could be needed to implement such accessible transport measures. For this purpose, a further knowledge is needed about the economic benefits of the quality of life experienced by the older people as a result. The summary of various issues of this profile along with present knowledge, current provision and knowledge gap is given in Table 6.5.

Table 6.5: Analysis of the issues of The Care-Full using public transport

<table>
<thead>
<tr>
<th>Issue</th>
<th>Present knowledge</th>
<th>Current provision</th>
<th>Knowledge gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessibility</td>
<td>Age and health related issues</td>
<td>Best practices and guidelines available</td>
<td>Methodology of assessing benefits from accessibility measures</td>
</tr>
<tr>
<td>Affordability</td>
<td>Is an issue</td>
<td>Best practices and guidelines available</td>
<td>Methodology of assessing benefits from affordability measures</td>
</tr>
<tr>
<td>Availability</td>
<td>Due to frail health may need special services</td>
<td>Best practices and guidelines available</td>
<td>Methodology of assessing benefits from availability measures</td>
</tr>
<tr>
<td>Safety</td>
<td>This group of people need assistance to make a journey and hence acceptability is not an issue</td>
<td>No special provision for this group</td>
<td>Not likely to be an issue</td>
</tr>
<tr>
<td>Driver attitude</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transition point</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The analysis showed the areas with existing knowledge available and some areas of knowledge gap. Within the areas of knowledge gap, there are specific researches that need to be carried out. These areas recommended for future research are given in the next section.
7 Conclusions and Recommendations

7.1 Summary

Public transport is important to older people’s quality of life, their sense of freedom and independence. Access to public transport can help older people to avail of goods, services, employment and other activities. Despite the need of public transport, older people face a number of barriers when undertaking journeys identified in earlier researches (Help the Aged, 2006 and Gilhooly et al, 2006) included: physically inaccessible transport vehicles, safety concerns, attitudes of transport staff, difficulties in carrying heavy loads, services running late, behaviour of some passengers, affordability and poor cleanliness.

In the ideal world, older people would like to have accessible, affordable, frequent, comfortable, door-to-door, spontaneous services with access to a large variety of destinations over an extended period of time. A recent resource guide developed by UK Department for Transport (DfT, 2010) themed at four main issues as: affordability, availability, accessibility and acceptability. These issues were used as the basis for assessing the public transport needs of GOAL profiles of older people (Fit as a fiddle, Hole in the Heart, Happily Connected, An oldie but a goodie, the Care-full). The assessment showed that the needs differ from one profile to another depending on the characteristics.

The literature review showed that with growing population of older people, their needs addressed or reflected recognised in many national and EU level policies. As a result, a number of best practices covering various aspects of public transport (especially accessibility issues) are implemented at various local, national and EU levels in different countries around Europe. In addition, directives and guidelines have also been developed to standardise such implementation. However, the level of implementation varies from country to country and place to place.

These various current provisions were then analysed against the needs of different GOAL profiles of older people. The analysis showed the areas with existing knowledge available and some areas of knowledge gap. Within the areas of knowledge gap, there are specific researches that need to be carried out. These areas recommended for future research are given in the next sub-section.
7.2 Recommendations for future research

Based on the study carried out, there are some gaps in the understanding of different aspects of older people using public transport. After discussion of the findings in the workshop in February 2013, following areas are recommended for future research:

**Research on the issues of transition to public transport**

Some older people are not regular public transport users. However, with age related or other health issues, they may have to make transitions from private cars to public transport. The experience of transition may differ from person to person and depends on the causes of transition. There is a knowledge gap of the reasons of transition and consequences to a person making such transition. In this respect, research is needed to develop methodologies to implement targeted intervention based on the prior experience of a person making transition to public transport. Such intervention could be simply a provision of published information or a guided tour of a journey an older person is planning to make. An holistic approach described is particularly relevant to this area of research.

Another area for targeted research could well be the identification of ways to increase the awareness level of close relatives to assist on the transition to public transport. The role of relatives and close friends is important and varies according to the different profiles of older people. Care units that exist in many countries in different forms also have a significant role to play, and their possible contribution towards this target should be further explored.

**Methodology for assessing benefits of accessibility measures**

Accessibility has been the main focus of initiatives to help older people using public transport. As a result, there are a number of best practice examples and various guidelines for the implementation of accessible facilities are available. Such facilities include: accessible bus, bus stop, approaches, special services, etc. However, in the current economic climate, economic justification is particularly needed for such measures. Research is needed to develop a methodology to assess the economic benefits of such measures in terms of improved quality of life (rather than traditional economic value of time savings only).
Safety and security concern of using public transport

Older people take much longer to recover from injuries than younger people and the results could affect their life experience for some time. Hence, safety (actual and perceived) is a major concern for many older people using public transport. There are good practices available to reduce such safety concern (e.g. travel training). However, more comprehensive research is needed to identify the level of perceived and actual safety concerns of older people and the best ways of mitigating them. One such topic is trips or falls in buses in relation to the driving behaviour (e.g. speed, acceleration and deceleration). Such driving behaviour data could be collected from automatic vehicle location (AVL) systems.

Security, either on the way to the bus stop or on-board, is also a major issue and older people are more afraid of insecure environments than unsafe ones. Ensuring a secure environment will help older people to more easily make a transition to public transport. The role of central and local authorities and of PT authorities and operators is important and focused research will be necessary to increase both the effectiveness of measures to improve security in real terms and to transmit that message to older people and their relatives.

Identification of the measures to influence good driving behaviour

A driver attitude and driving behaviour could play a key role in older people accepting public transport as a mode of transport. However, the seriousness of this issue depends on the physical capability of a person. For example, a fit person may not be affected by harsh acceleration/deceleration, whereas a frail person could fall and become injured. This could prevent an older person from using public transport. Good driving could be encouraged by measures such as monitoring, policing and controlling behaviour. Research is needed to identify the best measures, taking account of the views of all stakeholders including drivers, trade unions as well as older people.

In some cases, public transport drivers have to accelerate/decelerate quickly to complete their journey on time or because of traffic conditions. This is the case, for example, where operators have reduced the scheduled journey time to take advantages of improved vehicle performance to maximise the profit. The safety consequences for older people who need more time to board and alight may not be considered adequately. Such issue, could be addressed by the inclusion of safety related parameters into the operational performance
requirements. Further research is needed to identify the issues relating to the implementation of good practice (e.g. good driving) in the field.

**Development of older people friendly information system**

Information is one of the key factors in attracting older people to use public transport, but needs to relate to older people’s abilities. In general, the population of older people using smartphones and other recent technologies is increasing, although the ability to use such newer technology varies from a person-to-person. In addition, older people with different disabilities and competences have different requirements. For example, the requirement of a visual impaired person will be different from a person with poor hearing. Text size, colour and brightness are some of the features that may affect the usability of such applications by older people. Comprehensive research is needed to identify the requirements of the older people to provide travel information using such new technologies (e.g. smartphones). Research is also needed to explore efficient ways of providing travel information by traditional methods (e.g. using a phone) for those who do not use new technology. For example, traveller information could be provided using a phone or a help button at bus stops.

Research should also identify the needs and preferences of older people friendly information systems. For example a younger trip maker may focus on the shortest journey from an origin to a bus stop or to a final destination, whereas an elderly person may use other criteria for selecting the most preferable route, i.e. the safest, most reliable or more secure one, if such information is available. This area is more fully addressed in the outcome of D5.1.

**Development of special PT quality indicators for older people**

As a result of various initiatives, there are many good practices addressing the need of older people across Europe. However, there are considerable variations from country to country and from place to place. The transfer of good practices implemented successfully in one place could benefit older people elsewhere. For example, the inclusion of quality related Key Performance Indicators (KPI) for PT operations is a proven to improve offered services for PT users. European Standard EN 13816 has set a framework for that and a number of core-KPIs can be created to address PT quality issues. The inclusion of new KPI’s addressing issues related to older people mobility – including accessibility, affordability, etc. would well be a breakthrough in achieving better conditions for this category of (potential) PT users. Benchmarking could be implemented to initiate such processes in a more standard way, and further research could be carried out to develop benchmarking methods across Europe.
8 References


Civitas II, Policy Advice Notes Enhancing the quality of public transport services, 2010


SIZE project, State-of-the-art report, Public paper from WP2, Transport Research Centre, Brno, Czech Republic, 2003


Steg, 2003, Can Public Transport compete with the private car, IATSS RESEARCH Vol.27 No.2, 2003


TransLink Public Transport User Survey Summary, Translink Transport Authority, Queensland, Australia, 2010


## Table A1: The 5 A's of Seniors-friendly Transportation (Beverly Foundation, 2008)

**A Senior Friendliness Calculator for Public and Community Transportation Services**

The 5 A’s of Senior-Friendly Transportation are criteria which can be used by transportation services to make a judgment as to their senior friendliness. To initiate your review, check each of the factors below that are represented within your public or community transit service. Each check equals one point. When you have completed your review, add up your score and look at the scoring key at the bottom of the page to know where you are on “the road to senior friendliness.”

### Availability: The Transportation Service...
- Provides transportation to seniors
- Can be reached by the majority of seniors in the community
- Provides transportation anytime (day, evenings, weekends, 24/7)
- Can take riders to destinations beyond city & county boundaries
- Maintains organizational relationships with human service agencies

### Acceptability: The Transportation Service...
- Uses vehicles that are easy for seniors to access
- Offers “demand response” with no advance scheduling requirement
- Provides driver “sensitivity to seniors’ training
- Adheres to narrow “window of time” for home and destination pick up
- Ensures cleanliness and maintenance of vehicles

### Accessibility: The Transportation Service...
- Can accommodate the needs of a majority of elders in the community
- Has information program for improving senior transportation knowledge
- Can provide “door-to-door” transportation when needed
- Can provide services to essential and non-essential activities
- Can link seniors with “more appropriate” transportation options

### Adaptability: The Transportation Service...
- Will provide transportation escorts when needed
- Can access vehicles that accommodate wheelchairs and walkers
- Maintains a policy of “adapting the system to meet needs of seniors”
- Undertakes annual senior customer survey for service improvement

### Affordability: The Transportation Service...
- Offers reduced fares (or free transportation) to senior passengers
- Secures funding specifically to support senior transit services
- Offers opportunity to purchase monthly pass instead of paying cash
- Offers options for purchasing tickets by mail or the internet
- Uses volunteer drivers to reduce costs for providing “extra” services

### The Road to Senior Friendliness

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Just Starting</td>
</tr>
<tr>
<td>5</td>
<td>Out of the Garage</td>
</tr>
<tr>
<td>10</td>
<td>On the Road</td>
</tr>
<tr>
<td>15</td>
<td>Chugging Along</td>
</tr>
<tr>
<td>20</td>
<td>Getting Close</td>
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<tr>
<td>25</td>
<td>Senior Friendly</td>
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Total (Possible Score = 25)
### Table A2 – Indicators for an accessible transport (Mediate, 2008b)

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<td>Accessibility plan</td>
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<tr>
<td>A2</td>
<td>End-user involvement</td>
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<tr>
<td>A3</td>
<td>Integrated accessibility policy</td>
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<table>
<thead>
<tr>
<th></th>
<th>Service operations and standards</th>
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<tbody>
<tr>
<td>B1</td>
<td>Meeting user needs</td>
</tr>
<tr>
<td>B2</td>
<td>Accessibility maintenance</td>
</tr>
<tr>
<td>B3</td>
<td>Fare policies &amp; alternative services</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Information and ticketing</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>Accessible information</td>
</tr>
<tr>
<td>C2</td>
<td>Accessible ticketing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Vehicles and built environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1</td>
<td>Accessible vehicles and built environment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Seamless travel</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>Seamless travel</td>
</tr>
</tbody>
</table>
Table A3: Good practice examples of accessible public transport in Europe (Pt access, 2008)

<table>
<thead>
<tr>
<th>City / Region / Country</th>
<th>Country</th>
<th>Project</th>
<th>Type of Disability</th>
<th>Engineering / Technology / Design / Infrastructure</th>
<th>Organisational / Operational Support</th>
<th>Awareness Building</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aberdeen</td>
<td>Scotland</td>
<td>Accessible Demand-Responsive Service as Regular Rural Public Transport</td>
<td>✔ ✔ ✔ ✔</td>
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<td>Athens</td>
<td>Greece</td>
<td>Conversion of an Historic into an Accessible Metro System</td>
<td>✔ ✔ ✔ ✔</td>
<td>✔ ✔ ✔ ✔</td>
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<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Austria</td>
<td>Austria</td>
<td>New Accessible Barrier-Free Overland Buses in Use</td>
<td>✔ ✔ ✔</td>
<td>✔ ✔ ✔</td>
<td>✔ ✔ ✔</td>
<td>✔ ✔ ✔</td>
</tr>
<tr>
<td>Austria</td>
<td>Austria</td>
<td>New Railjet Trains with Innovative Equipment for Mobility-Reduced People</td>
<td>✔ ✔ ✔</td>
<td>✔ ✔ ✔</td>
<td>✔ ✔ ✔</td>
<td>✔ ✔ ✔</td>
</tr>
<tr>
<td>Barcelona</td>
<td>Spain</td>
<td>CityBee Localisation and Rescue of Lost Persons</td>
<td>✔ ✔ ✔</td>
<td>✔ ✔ ✔</td>
<td>✔ ✔ ✔</td>
<td>✔ ✔ ✔</td>
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<tr>
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<td>Germany</td>
<td>Introduction of the Label “Barrier-Free” to State Accessible Facilities</td>
<td>✔ ✔ ✔</td>
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<tr>
<td>Berlin</td>
<td>Germany</td>
<td>Mobility Training Especially for People with Motor Impairment</td>
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<td>✔ ✔ ✔</td>
<td>✔ ✔ ✔</td>
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<tr>
<td>Berlin</td>
<td>Germany</td>
<td>Navigation System for Impaired People at the New Berlin Main Railway Station</td>
<td>✔ ✔ ✔</td>
<td>✔ ✔ ✔</td>
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<tr>
<td>Berlin</td>
<td>Germany</td>
<td>Newly Innovated Mechanically Retractable Ramps for Trams</td>
<td>✔ ✔ ✔</td>
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<td>✔ ✔ ✔</td>
</tr>
<tr>
<td>Berlin</td>
<td>Germany</td>
<td>People Mover – Combination of Elevator and Bridge to Access Platforms</td>
<td>✔ ✔ ✔</td>
<td>✔ ✔ ✔</td>
<td>✔ ✔ ✔</td>
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<td>Bucharest</td>
<td>Romania</td>
<td>Transformation into an Accessible Public Transport System</td>
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<tr>
<td>Budapest</td>
<td>Hungary</td>
<td>Introduction of Low-Floor Buses in New EU Member Countries</td>
<td>✔ ✔ ✔</td>
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<td>Burgos</td>
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<td>Transport Action Plan to Support Accessibility in Public Transport</td>
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<td>Cologne</td>
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<td>Construction of Barrier-Free Low-Floor and High-Floor Tram System</td>
<td>✔ ✔ ✔</td>
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<tr>
<td>Dresden</td>
<td>Germany</td>
<td>Travel Assistance in Public Transport for PRM</td>
<td>✔ ✔ ✔</td>
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<td>Dublin</td>
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<td>Accessible Light Rail Transit System</td>
<td>✔ ✔ ✔</td>
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<td>Ireland</td>
<td>Transport for All Programme – Accessible Bus Fleet and Awareness Campaigns</td>
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## Deliverable 4.1

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