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Assessing the value of the information provision for enhancing the autonomy of mobility impaired users. Madrid pilot Site Study.

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1 ABSTRACT

A City is the space where every person acquires the citizen condition, which demands access to multiple services and facilities, and develops social relations in a free and equal condition of options. A lack of accessibility limits independency and autonomy. Thus, the relationship between "sustainable development" and "accessibility for all" becomes clearer, and both goals reinforce each other. In this sense, information plays a key role in order to overcome existing barriers, specially for people who rarely use public transport, have impaired mobility, or make a particular journey for the first time. The impact and benefits is linked with public transport as a "facilitator" of mobility, and, in particular, for the aim of intermodality. The usefulness of information that should be provided (both the information itself and how is offered) to mobility impaired users (MI users) is discussed on this paper based on following of the ASK-IT project that has being carry out on Madrid. The work was done in close cooperation with representatives of all different types of MI user groups

2 INTRODUCTION – AN INTEGRATED APPROACH FOR PUBLIC TRANSPORT.

A City is the space where every person acquires the citizen condition, which demands access to multiple services and facilities, and develops social relations in a free and equal condition of options. A lack of accessibility limits independency and autonomy of citizens in terms of capabilities to choose and interact with the environment and opportunities to participate in the social life of the City. Autonomy and mobility required for independent living are rights, and Public Transport should be a reliable tool for achieve them.

Thus, accessibility is seen as an important prerequisite to allow people, all, to achieve equality and full participation in society. Thus, accessible transport systems are essential for equality of opportunity for all people in society. In this perspective, the relationship between the concept of "sustainable development" and "accessibility for all" becomes clearer, and both goals reinforce each other. In recent years, particularly in relation to disability issues, there has been an increasing acknowledgment of the impact of transport policy upon certain groups within society.(Hine and Mitchel, 2001)

The evidences suggest that some people are unable to meet their essential transportation needs by their own. They need some support (extra compared with others) in order to achieve their desires of mobility:

- personal support or assistance made by a relative or specifically arranged for it

- possess sufficient financial resources to purchase specific transport services

- reside in communities well serviced by transportation options for non-drivers

Otherwise they have to reduce their activities and expectations to better adapt to their present situation (Burkhardt et al., 1999). A discrimination or exclusion is produced.

Public authorities, especially at the transport area, have the responsibility to equilibrate individual and collectively interests in other to achieve a sustainable development. But at the same time and regarding to a public service, as public transport is, there is also a demand for reaching a system accessible for the whole population. Apart that nowadays, mobility achieved by uncomfortable, dangerous, or undignified means is not acceptable.

Accessibility should be present in every initiative that affects human activity. From urbanism, areas, zones and uses must ensure general cohabitation. From building, not just its uses must be guaranteed in autonomous conditions, but evacuation as well. In transport, infrastructures, vehicles and interaction between both should be aligned for rendering efficient services without exclusion of any social stratum, impaired or not. And at last, information, as key element in our society in the way we work, play, learn, do business, spend leisure time…, but also in the way we access or egress from somewhere. Signing must be efficient, understandable, updated and normalized. This means that information and signing should be accessible in order to overcome existing barriers as part of both citizens' rights of movement and new opportunities for development, prosperity and quality of life that Information and Knowledge Society offers.

Most of the strategies driven until now have to do with physical aspects: "Accessible Vehicles" *(access to urban transit has been transformed by the introduction of different modifications as low-floor vehicles in other to adapt the vehicle to some social groups needs) or "Accessible Infrastructure" (where new subways, extensions to old systems, light rapid transit systems are being built to be accessible to passengers mainly physical disabilities (Wheelchairs mobility impaired users)). On the other hand, some initiatives have been taken on the *Accessible Information* issue (Travel information about transit and paratransit services is being made accessible for people with sensory impairments. During travel, real-time information is available visually and audibly at stations, at bus stops, and inside trains and buses. Inductive loops are being used at booking and information desks, in stations (for public address systems), and in trains for travellers with hearing impairments. Travellers with visual impairments are being assisted with tactile and audible signage systems….).

All of these initiatives are set out to create a transport system safer, more efficient, cleaner or fairer. This is a sustainable system by definition. But there is a partial problem to be solved: the inexistence of adequate criteria for evaluate or measure the social impacts of transport planning practices, procedures and measures. There are not definable concepts or methods to measure these social impacts. There is not precise definition of these terms or agreement on the ways in which these concepts can be arranged to quantify the transport needs of people within society (Hillman et al., 1973; Tolley and Turton, 1995; Tyler, 1999). The traditional approaches used to measure demand and supply are often unsatisfactory to incorporate the many subtleties and complexities that influence the trip undertaken. Some authors have concerned, relatively recent, about the linkages between patterns of transport access and social exclusion (Church et al., 1999; Hine and Mitchel., 2001), but no deep studies on the linkages of accessible information and social inclusion.

This communication will debate, according to an European Project that will be developed and implemented on seven cities named ASK-IT, about usability, efficiency, effectiveness and usefulness of the outcomes of new informational services and their impacts. ASK-IT Integrated project, which is co-funded by the European Commission, has promised to support and promote the mobility of MI people, enabling the provision of applications and services and facilitating knowledge and content organisation and processing.

Main lesson expected from this project will be related to:

- User Needs and Content Verification. Mobility impaired user needs collected will be used to assess and verify the content generated for the target user population: quality, usefulness, ease of comprehension or content suitability will be examined and evaluated against the user needs.

- Tools Assessment. Usability attributes will be defined on the basis of human computer interaction. Issues examined will include easiness, usability, learnability, accessibility, etc.

- Contextual Framework Assessment: specific usability evaluation will be performed on the mediators between human and information. The advanced user interfaces to be developed will be examined against intuitiveness, effectiveness, accessibility and friendliness in all appropriate forms (auditory, visual, tactile, etc.). Alternative delivery platforms (internet, mobile, etc.) will be also assessed, ensuring usability of the diverse final products

3   MADRID PUBLIC TRANSPORT AUTHORITY STRATEGY.

Madrid inhabitants make approximately 17,500,000 journeys per working day, according to the latest mobility study (EDM 04). According to the graph, three out of four journeys are made by motorised transport.

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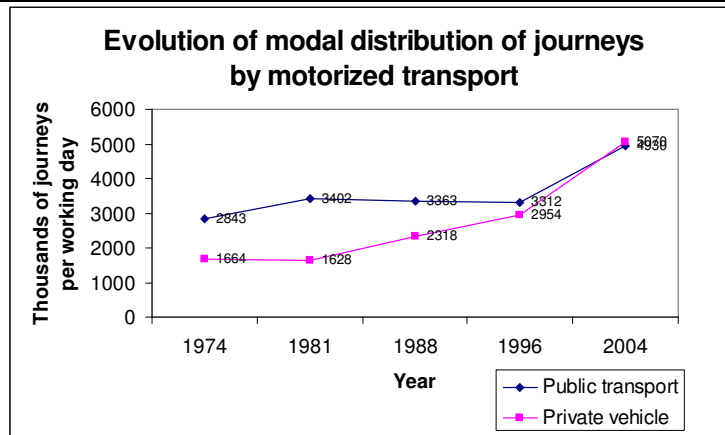Juan Luís VILLALAR, Lara VENTOSO, Javier CHAMORRO MATA

Figure 8. Number of Journeys per working day in public transport and in private vehicles.

Madrid is characterized for its high use of public transport, especially in the central areas of the capital, reaching a share over 74%, referring to privately-owned transport. Regarding journeys within Madrid Region, the ratio of public/private transportation means is 50%. Efforts to expand the Metro Network and the rest of the Public Transport System have resulted in breaking the stagnant situation in Madrid, while demand rose 50% between 1996 and 2004.

Mobility Impaired (MI) people have a wide variety of functional impairments, and it should be noted that only 2-3 percent of disabled people are in wheelchairs. However, any activity limitation that prohibits the free movement of a person means that the person has mobility impairment. Barriers to access are not confined to wheelchair users and those with other mobility impairments: Low vision or impaired hearing, speech, learning or language difficulties, cognitive problems, etc. In all of them, ageing plays an important role.

Just under 20 percent of people living in Europe are unable to read. Approximately half of these could be considered mobility impaired under circumstances where literacy is required to make use of transport facilities. ut in general, the population of Europe is getting older due to lower fertility-rates and longer life expectancy. At present, more than 69 million EU residents are over 60 years of age and the proportion of elderly people in the population will increase from present levels of 10-15 percent to 20-30 percent [Eurostat, 2001]. Moreover, among the 344 million Europeans, approximately 100 million are over the age of 50 and significantly it is estimated that over 80 million EU citizens have some form of mobility impairment, of whom 50 million have activity limitations.

These dramatic changes in the composition of the population will provide new challenges for the provision of transportation services, especially because travel patterns and needs are likely to become more complex.

Madrid Region has 12.7% of Spanish population. More than 3 millions people live in Madrid Municipality, out of the 5 millions that live in the Region. Since 1870's, Madrid's population has been growing constantly, especially between 1950 and 1970 when the number of inhabitants increased from 1.5 to 3 millions. More than 800 thousand people out of 5 million (15,7%) has 65 five or more and, as life expectancy continuously growing, projects shows a higher dependency.
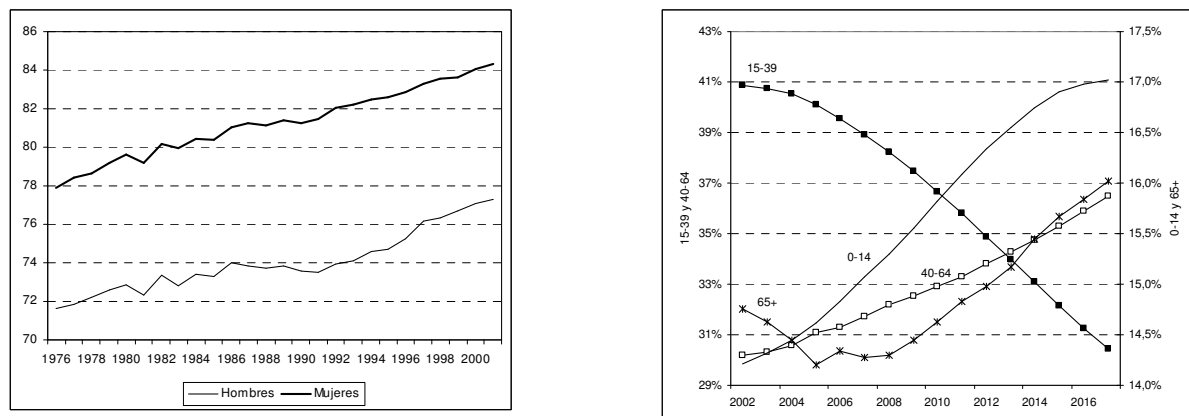

Fig 1 - Life expectancy and population structure evolution in Madrid. [IEM, 2001]

Ageing is relevant not just for the current figures, but also taking into account that social realties are changing: we no longer live on large family units, life expectation is increasing, demographic trends, etc. This, summed to our increasing demand of meeting friends, doing shopping, recreational or educational activities, etc. as essential parts of an active life, completes a scenario where accessibility becomes, and will be enhanced in the near future, a crucial aspect of our life. Relate to MI people, ageing is also an important factor. More than 3 thousand people is identify in Madrid as MI person. Nearly 60% over 64 years old.
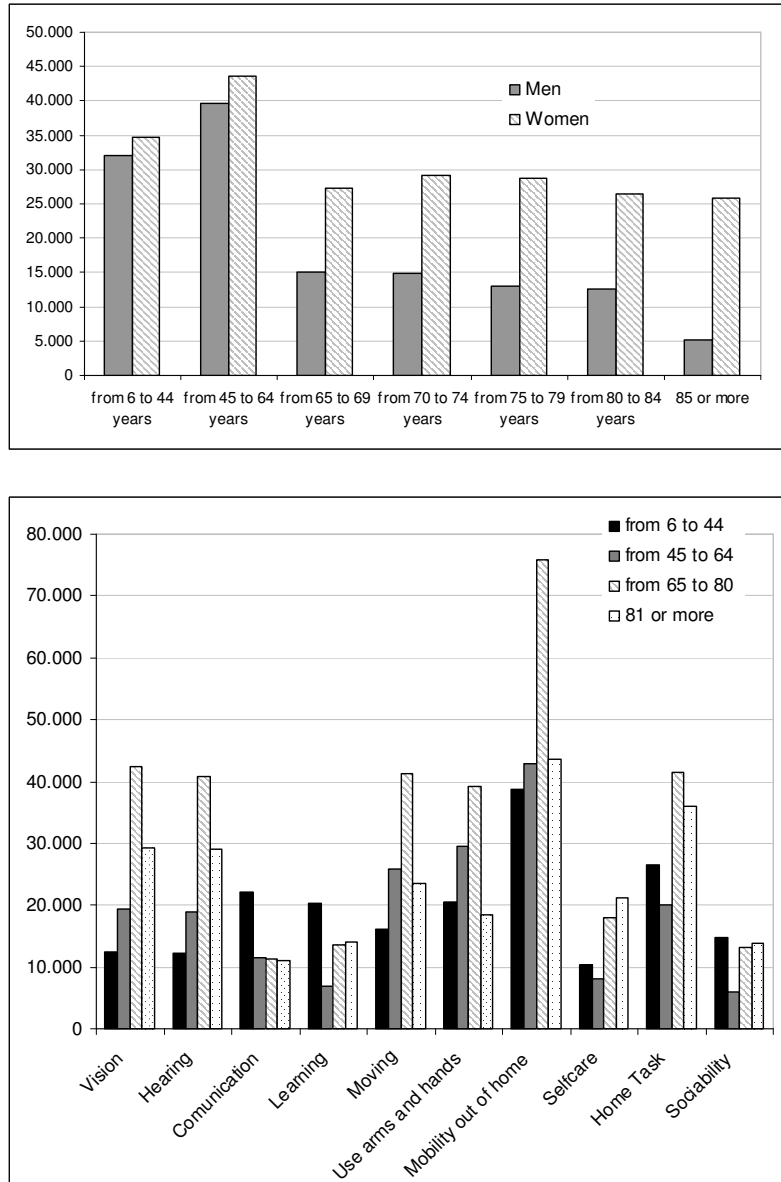

Fig 2 Mobility Impaired Users in Madrid. [IEM, 1999]

However, any activity limitation that prohibits or limits the free movement of a person could be regarded as a mobility impairment: pregnant women, tourist in a foreign city o country, or any other situation that limits the use and enjoyment of City facilities should be incorporated to the service design process: This also means that Social exclusion is also a dynamic state and individuals can regularly move in and out of this situation (Atkinson and Hills, 1998).

Existing research literature suggests it is possible to group the more particular factors that may limit the mobility of socially excluded people into seven main categories, all of them summarized on (Hine et al, 2000)

- Physical exclusion
- Geographical exclusion
- Exclusion from facilities

- Economic exclusion:

- Time-based exclusion:

- Fear-based exclusion

- Space exclusion

The following lines will describe briefly the most important improvements and new initiatives for each transportation mode in Madrid.

3.1 Madrid Metro System

3.1.1 Infrastructures

Madrid Metro System is equipped with access ramps for wheelchairs to the trains, lifts between all levels in the stations and accessible ticket vending machines, especially beneficial to users with lower of upper limb impairments.

Table 1 presents some statistical data regarding the accessibility of Madrid Metro stations in May 2007.

Table 5. Accessible Metro Stations in Madrid. May 2007

ACCESIBLE METRO STATIONS IN MADRID (MAY 2007)	
Stations with steepfree access and lift	162 (59%)
Total Stations	276

The pavement has yellow signals indicating danger of the direction in which passengers should enter or exit platforms and stairwells at the entrance and exit of lifts, in front of ticket vending machines, as well as indicating danger areas.

Regarding the signals and posters in the metro stations, they are usually large, clearly displayed on walls and at the entrance of lifts, with contrast between the background and the colour corresponding to the line' identification number. This will especially benefit visually impaired users. (capital)

Figure 9. Madrid Metro System adaptation for disabled users

3.1.2 Mobility

New trains are equipped with diverse accessibility features such as: adjustable ramp for wheelchair access, back support, increased number of handrails in contrasting colours, illuminating warning signals and buttons to indicate opening of the doors, warning elements and sound and visual alerts and clearly indicated reserved seats for persons with reduced mobility.

3.1.3 Pilot Scheme in Canal and Colombia stations

Two of Madrid metro system stations are the testing ground were new accessibility practical solutions such as grooved or textured paving, large signals, etc. are developed, so thereafter, they are gradually introduced them in all the stations that conform Madrid Metro network.

3.2 Madrid Light Rail System EXTE

3.2.1 Mobility Initiatives

In 2007, the new Light Metro trains have started running. These trains are part of the metro extension plans and have adopted the same accessibility principles than the Metro trains.

The metro extension plan, together with the remodelling of Metro line 3 and the actions undertaken, is expected to result in a metro and light rail network of which, in 2007, 64% of stations will be accessible by people with reduced mobility.

3.3 Parla Urban Light Metro System

3.3.1 Initiatives in the adjacent urban space

The urban surroundings similar to the urban appearance of the new Light Metro will be identified and delimited, especially focusing on the fact with special attention to the fact that every disabled people can travel in a safe way and with the least hassle possible.

There are up to three significant areas in which action is underway: pedestrian walkways, mixed walkways and platforms.

3.4 Urban Buses (EMT) Transportation System

3.4.1 Initiatives

Regarding Madrid urban buses (See Figure 3), during 2006 the Madrid Municipal Transport Company (EMT), was equipped with a fleet of vehicles, all equipped with low platforms for the first time. Table 3 shows the statistics for low-level buses in 2007.

ACCESIBILITY OF MADRID URBAN BUSES. MAY 2007		
No. of Buses low-level	1,979	(97,9%)
Total no .bus network	2,022	

Table 6. Urban Buses accessibility. May 2007

Furthermore, it is expected that at the end of 2007, all those vehicles will have a wheelchair ramp and will count on the following assets (See Figure 2):

- Ramp for wheelchair access.

- Pneumatic lowering system which aims at facilitating access.

- The pavement or a special platform will eliminate the gap completely.

- A specific signal system, a button or some sort of warning system to request the ramp to be lowered.

- Handrails that do not inhibit people with mobility or visual impairment.

- Contrasting coloured buttons that are easy to reach and highly visible.

- Comprehensive information systems using different technologies applied simultaneously: visual, tactile, acoustic,

- Air conditioned spaces reserved for PRMs, which are clearly marked out and have warning buttons for specific stops.

Figure 10. Madrid urban bus.

3.5 Suburban Buses (EMT) Transportation System

The accessibility initiatives in Madrid Transportation system are also reflected in the Suburban Buses: ramps, access lifts, special spaces for wheelchairs, seats reserved for people with impaired mobility, handles and stop buttons in contrasting colours and at accessible heights, etc.

3.5.1 SIVATT Project (Passenger information system for universally accessible transport)

There are several trials are underway using systems based on telematic communications, intelligent tickets and positioning systems, which establish automatic communication (without conversation) between the driver and the individual waiting at the bus stop who wishes to use the ramp and is visually impaired or suffers from another condition that limits his mobility.

Table 3 illustrates the number and percentage of suburban accessible buses in Madrid.

ACCESIBILITY OF MADRID SUBURBAN BUSES.	
No. Accessible buses	1,222 (64,9%)
Total no. bus network	1,942

Table 7. Accesibility of Madrid Suburban Buses. TripAcces ENG, 2006

3.6 Cercanías (Local Train Network) Transportation System

Several actions have been undertaken in order to improve the Local Train Network accessibility:

- Access to trains for persons with reduced mobility: includes a ground level area that facilitates access to the train from the platform.

- Construction of ramps and installation of technical elevation measures.

- Other like:

    o Adaptation of installations and information points.
    o Adaptation of spaces for persons with reduced mobility or disabilities.
    o Platform-level elevation ramp in all stations that compose the Cercanías network.
    o Construction of new stations within the Cercanías network, exempt from all types of physical architectural barriers
    o Construction of new stations within the Cercanías network, exempt from all types of physical architectural barriers.
    o Refurbishment of existing stations, including the elimination of barriers by provision of mechanical elevation facilities or by other means that facilitate access to persons with reduced mobility.

Figure 11. Madrid Local Trains

3.7 Transport Interchange Stations

The 5 new Transport Interchange Stations aim at integrating various initiatives for the creation of accessible spaces and advanced accessibility measures, in accordance with the rest of those adopted for the rest of the Public Transport System of Madrid Region.

Figure 12. Example of Madrid Interchange Station

4   THE ASK-IT PROJECT

ASK-IT is an integrated project, partly funded by the European Commission under the 6th Framework Programme, e-Inclusion.

The driving vision behind the ASK-IT project is to develop services based on Information Communication Technologies (ICT) that will allow Mobility Impaired people to live and move more independently. Through a device (mobile phone, PDA) users will have access to relevant and real-time information primarily for travelling but also whilst home, for work and leisure services., leading to a quality life and as immediate result achieving economic and social integration

Figure 13. Logo of ASK IT

ASK-IT is a 4- year Integrated Project, which started at the end of 2004 and involves 57 partners from a range of organisations, including industry, research institutes and European user associations and is coordinated by SIEMENS (Spain) and CERTH/HIT (Hellenic Institute of Transport, Greece).

The project involves a demonstration phase during which the ASK-IT system is tested and evaluated in 8 cities across Europe. The Spanish pilot will be implemented in Madrid city.

It is expected that in each one of the 7 Core pilot sites (Den Hague is considered a Satellite Pilot Site), there will be 50 users participating. Among these, 5 will have travel to other pilot sites (international trip) and 15 will use the system for longer (maximum 2 weeks), in order to test the long-term effects (user learning and personalisation issues). In the Satellite site, 10 users will participate in the short-term tests and 20 in the long term ones.
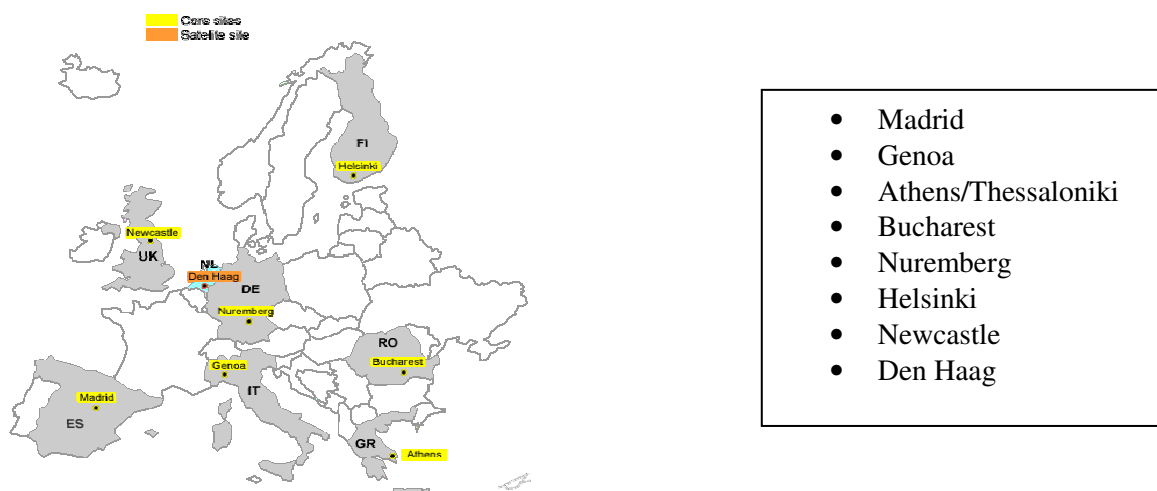

- Madrid
- Genoa
- Athens/Thessaloniki
- Bucharest
- Nuremberg
- Helsinki
- Newcastle
- Den Haag

Figure 14. Eight European ASK-IT Pilot Sites.

4.1   ASK-IT Project Objectives

ASK-IT integrated project aims to develop an Ambient Intelligence (AmI) space for the integration of functions and services for Mobility Impaired (MI) people across various environments (ASK-IT annex 2006), enabling the provision of personalised, self-configurable, intuitive and context-related applications and services and facilitating knowledge and content organisation and processing.

In its quest, to support the user in a holistic manner, ASK-IT focuses on geo-referenced and personalised transport and tourism services, which however are fully integrated to the home, work, leisure and sport, as well as the assistive technologies environments and devices. Emphasis is on seamless service provision,

independent on the media, user location (i.e. indoors, outdoors, in a city, during a trip, etc.), user type and residual abilities.

Thus, ASK-IT deals with the following key objectives:

1. Mediation of services and content: in a pervasive, translucent, understandable (by ontologies) and managed (by web semantics) way, supporting seamless and efficient supply – demand matching (service negotiation, brokerage, etc.).
2. Seamless environment management: Service provision everywhere, anytime and by many mobile and/or fixed means, using alternative business models.
3. User preference and context-related driven processes: automatic adaptation of service content and layout (user interface) to user explicit preferences (based on user profile) and implicit preferences (based on history of use of service) as well as to the context of use (user location, travelling mode, scope of travel, such as tourist, commuter, resident, etc.). In terms of User Interface hardware, optimised and innovative devices for both stationary and mobile communication give access to the services and tools by addressing the appropriate senses.
4. Flexible geo-referenced services: combining multimodal travel information provision with pedestrian navigation on accessible routes, both outdoors and indoors and according to the required level of accuracy by the user (i.e. higher accuracy required for blind people for obstacle avoidance) and the context of use (i.e. more precision required on the lane position while driving a car than being in the bus).
5. All within a user confidence based environment: handling issues of safety, reliability, security, privacy and usability.

4.2   ASK-IT implemented services

The following services will be offered to the ASK-IT users:

- Enhanced accuracy localisation
- Accessible intermodal route guidance
- Transport support: bus routes, bus stops, parking, train/metro/platforms, airports, train stations
- Tourism & leisure support: hotels, cultural sites, sport venues
- e-Commerce / e-Payment
- Domotics
- Health and emergency management
- Driver support (ADAS/IVICS)
- Computer accessibility
- Education support: accessible libraries
- e-Working, e-Learning systems and assistive devices
- Social& community building: local user, group organisation with website, including local relevant events.

4.3   Main outcomes expected from ASK-IT Project for Madrid Public site

Nowadays, the information that animates the world is dominated by nondisabled bodies—the world of transport planning is no exception (Barnes, 1991; Paterson and Hughes, 1999; Imrie, 2000). It can be argued that the information that communicates statements about mobility and movement not only fails to include a disabled person's perspective but also fails in a wider sense. This means that are conceived as and for a neutered person without any other consideration like disability, gender or other characteristic (Imrie, 2000).

Information should offer options in accordance to people needs from a mobility point of view. The driven vision is to develop services based on ICT that will allow people with special needs to move independently, increase quality of life and, as immediate result, achieve economic and social integration, providing relevant real-time information for users and their context, primarily for travelling, but also for use at home, work or leisure.

Currently, ICT service offerings are expanding and beginning to spread through those categories of citizens who are largely technically illiterate or techno-phobic. Meanwhile, people with disabilities and elderly every so often experience problems to access new technologies and services. There has been to date little consideration of a "design for all" philosophy to facilitate inclusion of a larger and even more quickly growing market, that of Europe's senior and special needs population. In spite of numbers, Elderly and Disabled (E&D) users have been slow to be "trendy". However as the younger market becomes saturated and the need for better designed systems for all becomes more apparent it is anticipated that industry will see a better business case for targeting E&D users.

The terms 'Design for All', 'Universal Design', 'Inclusive Design' or 'Barrier-free Design' are used to describe products, systems and services where consideration has been given to their use by all sorts of users, in all sorts of circumstances. This means that diversity, not just in the population but also In the scope, contexts and nature of its use or interactions, is considered. Therefore, is a step forward from a state of "with adaptation". However, even taking into account scenarios with the richer alternatives (user groups, context, etc…) in order to find something to cover every need, still there will be those who will need some assistive technology to access both equipment and services.
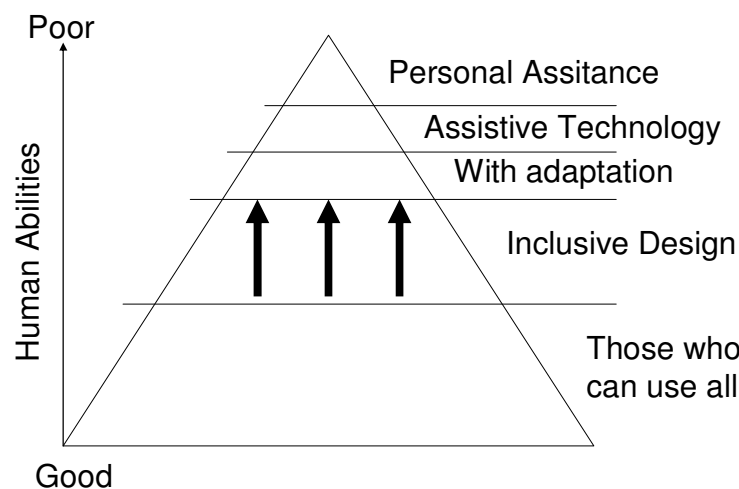

Figure 15. The Usability pyramid . (Nordby,2003)

In the context of information and communication technologies, the role of new technology in improving levels of mobility and independence amongst disabled and mobility impaired groups is likely to become increasingly important. As the information contained on a book, is fixed, both in content and in style of handling or presentation, these do not occur on a digital environment. At the time electronic information is accessed, the presentation style and the handling modalities can be selected, even automatically, according to the needs of different users. This flexibility is the baseline for avoiding discrimination and exclusion from some groups. Having the information available, it is not more a just a question of an individual's abilities but be able to provide suitable interfaces, products, systems and services.

In this sense, Design for All and eAccessibility still remain at the level of principles and lack a coherent theory which could guide development and application. ASK-IT pilots will focus basically on get some clear information about it. Mainly on:

- Research on the ways of interacting and communication based on user interaction abilities. This means really to specify the abilities and needs of users. The assessment of this interaction will be the basis to guide mainstream design for a human and computer interaction service.

- Research on reliable interfaces. Provide clear concepts for new devices that provide new means of interaction and principles for Assistive Technologies that can interact seamlessly with the mainstream human and computer service.

- Research on Systems, Services, Context Awareness and Semantics: Bringing Information and Communication Technologies and 'intelligence' into the environment increases the possibilities of overcoming problems of people with disabilities, and should guarantee that guidelines for accessibility are incorporated at the early stages.

- Research on impacts. Research on how these new approaches change the social, economical and ethical context of disability. Areas such as the lack of awareness and education in ICT/HCI domains in the area of care and service provision of people with disabilities and elderly people should be addressed . The economical, social and ethical implications should be discussed.

The results expected may be grouped in four large areas of analysis, providing information about the different factors involved in the process as well as the improvement in accessibility via the TIC in persons with reduced mobility.

- Technical issues: How does the technological system work?

- The User: How do they see the system working and what are their thoughts on the service provided?

- Impact: How is the project influenced, not only by the user, but also by all the implicated groups?

- Socio-economic questions: The willingness to pay on the part of the user as a way of measuring the usefulness of the service and an evaluation of the socio-economic profitability in order to evaluate the sustainable model of the service.

Table 9 Summarizes the evaluation aims of each evaluation area and the corresponding groups involved in the validation process.

EVALUATION AREAS	EVALUATION AIMS	GROUPS INVOLVED IN THE VALIDATION PROCESS
TECHNICAL ISSUES	• Band width • Performance of web services • Response time and delay time • Precision • Reliability • Availability • Accessibility • Data retention • Capacity • Safety	• Mobile device developers • Service providers, content and telecommunications.
USER	• User-friendly system • System Adaptation • Effects on user mobility	• Users
IMPACT	• User Mobility • User Standard of Living • User safety • Guarantee of service provided. • New business opportunity in sector rehabilitation. • Market penetration in mobility information services	• Experts
SOCIO-ECONOMIC QUESTIONS	• Willingness to Own • Willingness to Pay	• Users
	• Detection of strengths and weaknesses between ASK-IT and other systems available on the market.	• Users • Mobile device developers

Table 8. Evaluation aims of each evaluation area and groups involved in the validation process.

The evaluation process will be scored using the system in Table 10:

NO EFFECT	0
POSSITIVE EFFECT	+
VERY POSSITIVE EFFECT	++

Table 9. Scored system that will be used during the ASK-IT evaluation process.

The initial expected results are illustrated in Table 11.

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IMPACT	User Mobility	User Safety	User guarantee of service provided	Market penetration in mobility information services	New business opportunity in sector rehabilitation	
GROUPS						
Users	++	++	+	+	+	0
User Families	++	++	+	+	+	0
System Support Staff	+	0	0	0	+	++
Society	++	++	++	++	0	+
Service, contents and telecommunications suppliers	0	0	0	0	++	0
Mobile devices systems developers.	0	0	0	0	++	0

Table 10. Assement of effect and impact of the ASK-IT project at different levels.

5 CONCLUSIONS

Madrid has developed important initiatives related to accessibility for each transport mode in Madrid but also for interchanges facilities.

All actions are done following 3 ways; architectural accessibility, vehicles and information.

Madrid is also participating in ASK-IT project; partly funded by EC under 6th Framework Programme. It is developing an Ambient Intelligence space for the integration of functions services for Mobility Impaired people in a holistic manner based on assistive technologies.

Large impacts at different levels are foreseen so it is programming an assessment process that has been described.

6 ACKNOWLEDGMENTS.

7 REFERENCES

ATKINSON, A., Hills, J. (Eds.), 1998. Exclusion, employment and opportunity. CASE Paper 4, Centre for Analysis of Social Exclusion, London School of Economics, London.

BARNES, C. (1991) Disabled People in Britain and Discrimination: A Case for Anti-Discrimination Legislation. London: C. Hurst & Co.(Publishers) Ltd

BURCHARDT, T., LeGrand, J., Piachaud, D., (1999). Social exclusion in Britain 1991-1995. Social Policy and Administration 33 (3), 224-227

CHURCH, A., FROST, M. and SULLIVAN, K. (1999) Transport and Social Exclusion in London: Report Summary. London: London Transport Planning.

EUROSTAT, 2001

HILLMAN, M., HENDERSON, I. and WHALLEY, A. (1973) Personal Mobility and Transport Policy. London: PEP.

HINE, J., Mitchel, F. (2001) Better for Everyone? Travel Experiences and Transport Exclusión. Urban Studies, Vol. 38, No. 2, 319–332, 2001

HINE, J.,Swan, D., Scott, J., Binnie, D., Sharp, J. (2000). Using technology to overcome the tyranny of space: Information provision and Wayfinding . Urban Studies; Sep 2000; 37, 10; Academic Research Library pg. 1757

IMRIE, R. (2000) Disability and discourses of mobility and movement, Environment and Planning A, 32, pp. 1641–1656.

IMRIE, R., (1996). Disability and the City: International Perspectives, Paul Chapman, London.

INSTITUTO ESTADÍSTICO DE MADRID (1999). Encuesta sobre Discapacidades, Deficiencias y Estado de la Salud (EDDS) 1999.Modulo de Discapacidades. Comunidad Autónoma de Madrid

INSTITUTO ESTADÍSTICO DE MADRID (2004) *Proyecciones de la población por edad y sexo de la Comunidad de Madrid 2002-2017*. Estudios y Análisis. Comunidad Autónoma de Madrid.

NORDBY, K. (2003). "Design for All: Shaping the end-users' Tel-eEurope": CEN/CENELEC/ETSI Conference on 'Accessibility for All', Nice, 27-28 March 2003.(http://www.etsi.org/cce/proceedings/6_2.htm)

PATERSON, K. and HUGHES, B. (1999) Disability studies and phenomenology: the carnal politicsof everyday life, Disability and Society, 14, pp. 597–611

TOLLEY, R. and TURTON, B. (1995) Transport Systems, Policy and Planning: A Geographical Approach. New York: Longman Group Ltd.

TYLER, N. (1999) Measuring accessibility to public transport: concepts. Working Paper, Centre for Transport Studies, University of London