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USING THE TRAVELLING TASK AS A TOOL TO DEFINE ITS REQUIREMENTS FOR ELDERLY AND DISABLED PEOPLE

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SUMMARY

This paper describes the methods and tools used by the TELSCAN project to identify the requirements of elderly and disabled (E&D) travellers with various types of functional impairments. A Definition of the Travelling Task for different modes of private and public transport was used to capture the needs of E&D travellers through interviews with experts and focus groups with users. The data collection resulted in a generic specification of user requirements, in general and those specific to telematics, for elderly and disabled travellers. This methodology and data can guide the design of ITS and can provide a stepping stone to capture system-specific data to ensure that the needs of elderly and disabled people are included in the design process.

INTRODUCTION

The main objective of the TELSCAN project (Telematic Standards and Coordination of ATT Systems in relation to elderly and disabled travellers - a support action in the Transport Sector of the Framework IV Telematics Applications Programme) is to ensure that the needs of elderly and disabled (E&D) people are taken into consideration in the development and application of Intelligent Transport Systems (ITS).

The TELSCAN project brought together experts from both the DRIVE II TELAID (V2032) and EDDIT (V2081) projects, which covered respectively the needs of disabled and elderly drivers when using telematic systems. This knowledge and expertise was the starting point for our review of the requirements of disabled and elderly travellers. A broader survey then identified existing and prospective systems which could be used by the elderly and disabled, not only in the transport sector but also in telematics designed specifically for E&D people. These could include, for example, navigation and orientation aids being developed for people with visual impairments (1).
DATA COLLECTION TOOLS

Although in principle product designers and developers wish to consider the needs of elderly and disabled people, they may find it difficult to know where to begin, which groups to include, how to include them and how to ensure that all the users’ main problems and concerns are covered. To fill this need, the TELSCAN project developed two data collection tools to facilitate the capture of user requirements with elderly and disabled people from various impairment groups and using different modes of transport. These tools include a Functional Classification for Elderly and Disabled Travellers and a Definition of the Travelling Task.

E&D FUNCTIONAL CLASSIFICATION

The Functional Classification for Elderly and Disabled Travellers began with the classification first developed within the TELAID project (2). It was then re-designed to bring it more in line with the International Classification of Impairments, Disabilities and Handicaps (3).

An overview of the E&D classification (4) is given in Table 1, indicating in upper case the impairment categories defined by the World Health Organisation. Those groups in the shaded boxes were selected as the target of the TELSCAN data collection, in order to cover a range of skeletal, sensory, communication and cognitive functions.

<table>
<thead>
<tr>
<th>Impairment</th>
<th>Disability</th>
<th>Potential Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKELETAL - Motion of lower limbs</td>
<td>eg, Cannot walk</td>
<td>eg, Reaching departure points</td>
</tr>
<tr>
<td>SKELETAL - Motion of upper limbs</td>
<td>eg, Cannot use arms</td>
<td>eg, Use of ticket machines</td>
</tr>
<tr>
<td>SKELETAL - Motion of upper body</td>
<td>eg, Cannot turn head/neck</td>
<td>eg, Restricted scanning of environment</td>
</tr>
<tr>
<td>SKELETAL - Anthropometrics</td>
<td>eg, Short stature</td>
<td>eg, Reaching ticket machines</td>
</tr>
<tr>
<td>SKELETAL - Co-ordination/dexterity</td>
<td>eg, Difficulty using hand controls</td>
<td>eg, Using small buttons/knobs</td>
</tr>
<tr>
<td>SKELETAL - Force</td>
<td>eg, Reduced force in arms/hands</td>
<td>eg, Opening doors</td>
</tr>
<tr>
<td>VISCERAL</td>
<td>eg, Sudden loss of consciousness</td>
<td>eg, Obtaining help</td>
</tr>
<tr>
<td>VISION</td>
<td>eg, Blind or reduced vision</td>
<td>eg, Obtaining written information</td>
</tr>
<tr>
<td>HEARING</td>
<td>eg, Total or partial deafness</td>
<td>eg, Hearing announcements</td>
</tr>
<tr>
<td>LANGUAGE AND SPEECH (Communication)</td>
<td>eg, Cannot read or speak</td>
<td>eg, Obtaining travel information</td>
</tr>
<tr>
<td>INTELLECTUAL/PSYCHOLOGICAL</td>
<td>eg, Difficulty with new tasks or in decision making</td>
<td>eg, Operating new technology</td>
</tr>
<tr>
<td>Cognitive Functions</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
When following a functional classification it is clear that the elderly should not be a separate group for data capture or analysis. However, the requirements of an elderly person with mobility problems can be very different from a young wheelchair user, both in the type of assistance required and whether or not it is even thought necessary. For this reason, TELSCAN included further investigation specifically on the needs of elderly travellers, covering a gradual deterioration in vision, hearing, motor performance and information processing, and we would advise other projects to do the same.

During data collection with experts, the E&D Classification was used as a tool to ensure that every impairment group was considered. During data collection with elderly and disabled users, the Classification was used to help choose a range of impairments to invite to the focus group interviews and to define the boundaries for each interview group. The Classification also provides a structure for other Transport Telematics projects to identify and capture requirements, evaluate their product/service with the relevant E&D groups, and ensure that E&D are not excluded from using it. We realise, however, that it is difficult or impossible to include all these groups in the design process, and choices will need to be made, based on the user interface to the system and the groups of people who would be at risk from using it safely and easily.

**DEFINITION OF THE TRAVELLING TASK**

During data collection with experts and with users, the Definition of the Travelling Task was used as a tool to ensure that all relevant components of the travelling task were considered.

The development of the TELSCAN travelling task began with the driving task which had earlier been developed within the TELAID project (2). This was then extended within the Dutch Work and Handicap programme (5) to a travelling task which described the travel problems of commuters with disabilities. A working group on wheelchair users in public transport added further information on access problems and conceivable solutions for the short, medium and long term (6). The travelling task was then extended to include other modes of travel (e.g. by air and sea).

The use of a transport mode depends on the accessibility of the total transport chain. Poor design in the transport infrastructure (ranging from stairs to the use of only auditory announcements) can mean that a mode of transport will be inaccessible to some elderly and disabled people. Therefore, the travelling task has been designed to include all tasks and not just the ones related to possible telematic applications.

Table 2 outlines the travel modes covered and the structure of the TELSCAN Definition of the Travelling Task. The shaded sections indicate the priorities for this data collection. The tasks were divided into separate “checklists” for each mode of travel to facilitate data collection.

**Table 2: Modes included in the Definition of the Travelling Task**

<table>
<thead>
<tr>
<th>DRIVER</th>
<th>PASSENGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>II</td>
</tr>
<tr>
<td>Private transport</td>
<td>Private transport</td>
</tr>
<tr>
<td>car/van</td>
<td>car/van</td>
</tr>
</tbody>
</table>
The travel tasks are sorted mainly chronologically into pre-trip tasks (e.g. trip planning, ticketing), trip tasks and then special conditions (e.g. handling emergency situations).

A journey can consist of more than one consecutive trips, and within each trip we can find, for example, the following steps (each further broken down into related sub-tasks):

- Moving from origin to vehicle
- Boarding the vehicle
- Experiencing a safe and comfortable ride
- Alighting from the vehicle
- Going from vehicle to the (transfer) destination (boarding and alighting from the vehicle have been combined under the heading ‘entry/exit of the vehicle’).

DATA COLLECTION METHOD

The requirements of elderly and disabled drivers had already been identified through the work of the TELAID and EDDIT projects. So our aim was to broaden our previous studies (Section I in Table 2 above) and now concentrate on the requirements of elderly and disabled travellers using different modes of transport (Section III in Table 2 above), with special emphasis on ITS.

EXPERT INTERVIEWS

Much knowledge already exists through the Consortium’s previous work, through the literature and through earlier and on-going projects across the Telematics Applications Programme and other programmes. To supplement this data and to help us better understand the requirements of E&D, selected individual interviews were held with experts (e.g. transport authorities, customer services for airports/ships/railways/bus stations, and various associations and advocates for the elderly and people with disabilities). Using both the Travelling Task and the impairment categories in the Functional Classification we were able to cover a range of general requirements for E&D travellers and specific requirements relevant to ITS.

FOCUS GROUPS WITH USERS

No matter how many experts, literature sources and other projects one investigates, the only way to really understand the users’ requirements is to talk to the users themselves. Our method of gathering data from users was through focus group interviews, or roundtable discussions, whereby many and varied opinions could be elicited with reasonable effort and resources.

Given time constraints, it was possible that we would not get through all the modes of public transport. In order to identify the areas of most concern, focus groups would identify and discuss the reasons for choosing or not choosing a certain mode of transport, noting what might make that mode of travel easier or more suitable for their needs. It would then be clear which modes of transport and/or which type of systems to focus on for that user group. For example, in our focus group with blind travellers the users were asked to identify the modes of public transport they used and the relative frequency of travel, which helped to indicate trains and buses as their priorities. The reasons for non-use of the other modes were also noted.
The agenda for the focus groups covered:

- the problems people with different types of impairments have when using a specific mode of public transport
- to what extent these problems might be overcome using advanced technology systems
- the types of existing advanced technologies users are aware of, and the special requirements of elderly and disabled travellers when using those systems
- Suggestions for improvements or new solutions to make travelling easier

**DISCUSSION AND SUMMARY**

The result of the TELSCAN investigation (4) is a summary of the requirements of elderly and disabled travellers using different modes of transport, including private cars, vans/minibuses, buses/trams, metros/trains, ships and airplanes. It provides an overview of:

- The components of the travelling task causing difficulties for the main impairment groups
- What their main requirements are in general and to what degree ITS can fulfill these requirements, and
- Modifications to some existing systems or new system ideas

It is clear that telematic applications can offer new opportunities to support a disabled or elderly traveller in particular aspects of the travelling task, for example by providing information on the most accessible routes before setting out on a journey. This is just one aspect where the TELSCAN generic user requirements specification can guide the design of ITS. However, it is still necessary to capture a more detailed definition of user requirements for specific application areas or systems, and product developers can use TELSCAN’s methodology and data as a stepping stone to capture their own system-specific data.

TELSCAN urges designers and developers to consider our methods and user requirements data, as well as our code of good practice and Handbook of design guidelines, which is now being developed as a working draft (7). In this way, elderly and disabled people are less likely to be excluded from using a system that could especially benefit them and promote their mobility and independence.

**ACKNOWLEDGEMENTS**

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