

The Coding of Interface Requirements on Smart Cards for People with Disabilities

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If you wore bifocals, you would find it difficult to read the screen of a cash dispenser, since neither lens would be in focus at this distance. However it is possible to increase the size of the characters on the screen for individual customers who require this facility. This is just one example of what can be done to make self-service terminals easier to use by everyone.

When a person with a disability needs to use a self-service terminal, he or she may meet a number of difficulties. Some of these difficulties relate to finding the terminal or physically getting there, but many of the problems relate to the user interface on the terminal. Smart cards could potentially alleviate many of the problems concerning the user interfaces of self-service machines such as cash dispensers.

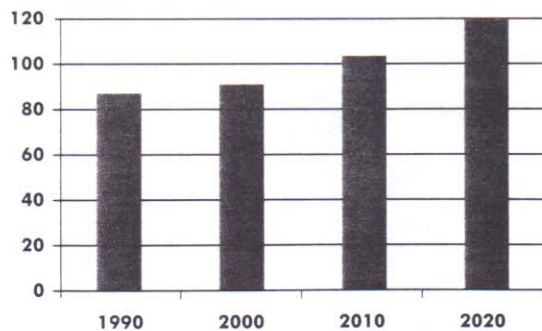


Fig. 1 Estimated population (in millions) of Europe aged 65 and over by year.

THE NUMBERS

In geographical Europe (with a population of about 800 million), there are about 100 million people over retirement age and 50 million people with disabilities. The prevalence of most forms of impairment increases considerably with age, and therefore the population of people with disabilities grows disproportionately as life expectancy rises.

In geographic Europe the estimated number of people with impairments such that they would have problems with using self-service terminals is:

Dexterity Impaired

Reduced function of arms and hands makes activities related to moving, turning or pressing objects difficult or impossible.

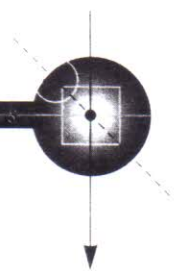
Cannot use fingers	1 Million	Reduced strength	22 Million
Cannot use one arm	1 Million	Reduced co-ordination	11 Million

Mobility Impaired

Reduced function of legs and feet means depending on a wheelchair or artificial aid to walking. In addition to people who are born with a disability, this group includes a very large number whose condition is caused by age or accidents.

Wheelchair user	3 Million	Cannot walk without aid	45 million
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Cognitively Impaired

A dyslexic person may be able to remember the digits of a four figure PIN but not in the right order.

Dyslexia 25 Million Intellectually impaired 30 million

Visually Impaired

Blindness implies a total or near total loss of the ability to perceive form. Low vision implies an ability to utilise some aspects of visual perception, but with a greater dependency on information received from other sources in addition.

Blind 1 million Low vision 11 million

Hearing Impaired

The term deaf implies a total or near total loss of hearing and such people do not benefit significantly from amplification. Hard of hearing people have lesser degrees of hearing loss and generally benefit from amplification. People born deaf may communicate using sign language rather than speech.

Deaf 1 million Hard of hearing 80 million

FINANCIAL TRANSACTIONS

The problems of many people with disabilities may appear trivial to a non-disabled person. For Instance many people would like a notch in the fascia of an ATM (automated teller machine) so that they can lean their walking stick against the machine without the stick falling over. Other problems require more complex modifications, but the technology is already available but frequently not implemented.

Many users would like to be able to choose the size of characters on the visual display as well as the foreground and background colours. Many elderly people would like the option of more time to respond to the machine's instructions, and the option of simplified operation (such as just withdrawing a pre-set amount of money).

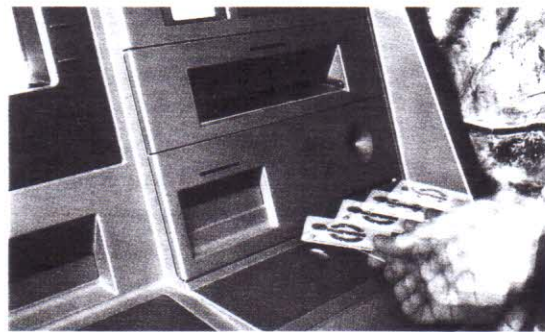
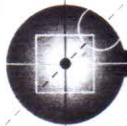


Table of Problems with ATMs

	Wheelchair User	Cannot walk without aid	Cannot use fingers	Cannot use one arm	Reduced strength	Reduced co-ordination	Dyslexia	Intellectually impaired	Blind	Low vision
Locate ATM								●	●	●
Access to ATM	●	●								
Read instructions							●	●	●	●
Insert card	●	●	●	●	●	●		●	●	●
Read screen	●						●	●	●	●
Use keyboard	●		■					■	■	■
Use touchscreen	●		■				●	■	■	■
Retrieve money	■	●	■					■	■	
Read receipt			■				■	■	■	●
Retrieve card	●	●	●	●	●	●			●	
Few problems	Some problems			Many problems						

● Technology available to alleviate the problem





TELECOMMUNICATIONS

The technology is already available to alleviate many of the problems faced by people with disabilities in using a public telephone, but only a few telecommunication companies provide the appropriate facilities. The table below illustrates some of the existing problems, but advances in technology will create exciting new solutions as well as some new problems. Many of these new solutions appear likely to be economically viable, and of benefit to all customers, if appropriate marketing is employed.

Up to now people with a hearing impairment have been the most concerned with problems of using a telephone. In the next few years there is likely to be a dramatic increase in the use of visual displays which will cause problems for visually impaired users.

Some public telephones now have the facility for

increasing the audio amplification, but smart card technology offers a method of storing the user's preferred audio frequency response which could make speech significantly more intelligible for many persons with a hearing impairment.

Network messages, such as "all lines busy: please call later", can be a problem for those with a hearing impairment or those who do not understand the language (e.g. foreign visitors). A smart card could store information on the users preference for this information to be presented in text form on a visual display and/or in another language.

Another application for smart card technology is to automate the dialling and logging in to a relay service; this might include automatically setting the text protocols to be compatible. On a public telephone, the smart card might unlock the keyboard for use as a text telephone.

Table of Problems with Public Telephones

	Wheelchair user	Cannot walk without aid	Cannot use fingers	Cannot use one arm	Reduced strength	Reduced co-ordination	Speech impaired	Language impaired	Dyslexia	Intellectually impaired	Deaf	Hard of hearing	Blind	Low vision
Locate telephone										●			●	●
Access telephone	●	●												
Read instructions/directory			●	●	●	●		●	●	●			●	●
Lift/hold handset	●		●		●	●							●	●
Use keypad/dial	●		●		●	●							●	●
Read visual display	●							●	●	●			●	●
Insert coins/card	●	●	●	●	●	●							●	●
Determine line status										●	●	●		
Speaking							●	●			●	●		
Listening								●			●	●		
Terminating call	●					●								
Few problems				Some problems				Many problems						

● Technology available to alleviate the problem



