

# Making Life Easier

How new telecommunication services could benefit people with disabilities

Edited by John Gill



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# Making Life Easier

How new telecommunication services could benefit people with disabilities

Some of the more common disabilities include:

- Blindness and partial sight
- Deafness and hard of hearing
- Impaired speech
- Physical disability varying from being confined to a wheelchair to having poor grip or a hand tremor, arthritis or rheumatism
- Cognitive impairments such as dyslexia, learning difficulty or dementia
- Allergies

**This publication has been designed to show how new types of telecommunication services could be designed in ways that would be of benefit to people with disabilities.**

**Most people already benefit from today's new telecommunications technology. Improvements in mobile communications, the internet and interactive mediums such as digital television have allowed most people access to more and better information and more instant, helpful services.**

**The question asked in this publication, is how can future telecommunications be designed to improve the lives of people with disabilities - and which services will be of particular benefit to specific groups? These groups will include people who are deaf, those with low vision, or elderly people who often have a combination of different impairments and may not consider themselves to be disabled. People and organisations that provide care should also consider how new telecommunication systems and services could help with their tasks.**

**If just some of these ideas become a reality there could be significant benefits for the wider population. People with disabilities could find it easier to work, people living alone or needing care could be less isolated, and those providing care could work more effectively.**

**To make this happen there must be sufficient interest and action from consumers, service providers and regulators. It is hoped that this publication will inspire and motivate those with influence.**

## At home . . . Communicating with other people . . .

The small hand-held telephone has become one of the main devices we use in our everyday lives. For nearly everybody, the technology for mobile phones has found more and more uses. The telephones in our homes use wireless digital technologies giving more freedom and functions.

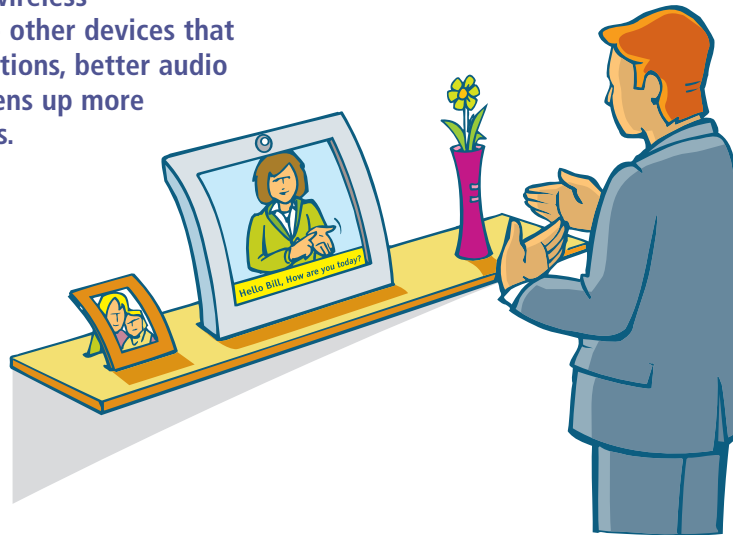
The small screens and buttons of many handsets are an obvious problem for most people with disabilities. However, the use of wireless technologies allows these small devices to be linked to other devices that have larger screens, simpler commands, automatic functions, better audio output, cameras and other help facilities. All of this opens up more possibilities for these new devices to help in our homes.

Bill has a severe hearing loss and his speech is very impaired. Some of his friends and family use sign language to communicate with him over a broadband camera link. When a person who does not know sign language calls, Bill can re-direct the call via a video relay service where a human operator acts as an intermediary.



The video calls can have captions in addition to audio output so a person with some hearing can follow the conversation; the captions are generated from a relay service. The text relay service employed operators to convert text to speech and vice-versa; however this has been superseded by services using a computer to handle these tasks.

There is an additional service for handling calls in a foreign language where the computer translates the text or speech into a different language.



Bill instructs special software in the telephone network to connect incoming calls to his answering machine after 9pm, except for calls from his immediate family. During the day the system automatically redirects calls via the relay service.

When Bill goes out, he asks the system to redirect calls to his mobile phone which incorporates a visual display of the text.

Angela is 75. She lives alone and has very poor vision. Because she cannot read labels on bottles and packaging, Angela has a device that sends a scanned image to a help centre. A person at the help centre then reads the information to Angela. Angela finds this contact with the help centre very reassuring.



Because Angela's help centre is linked by broadband, her call costs are very low. She also uses the system to contact her friends and family using VoIP (voice over broadband using the internet protocol).

Angela's telecommunication system has also been set up so that she can listen to talking books and newspapers. A wireless network makes this available throughout her apartment.

# At home . . . Access to information and entertainment . . .

The interactive communication systems that we have in our lives are enjoyed by all ages. In particular, many retired people have taken to the internet with great enthusiasm. The coming together of interactive digital television, radio and the internet is opening up ever more opportunities for people to enhance their access to information, manage finances, communicate, study, shop and trade.

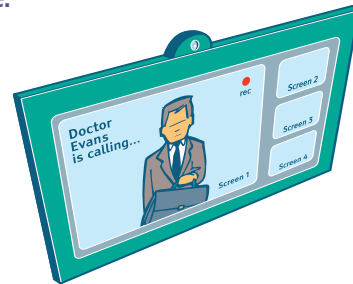
Katarina is 63 years of age. She is physically impaired and uses a wheelchair. Katarina is also from an ethnic minority. Broadband radio allows Katarina to listen to broadcasts in her native language with excellent audio quality.

Katarina's television is for entertainment but also enables her to link to a web community at her local church. She can also link in to her family, nearby and abroad. They talk and can see each other on their screens.

The system also has a care and support system that enables Katarina to check in and book a free minibus for local journeys. She can also link to her local doctor and nurse, conversing via the screen.

Katarina also wants to improve her ability to communicate in the language of her adopted country. Her TV allows her to use a web-based tutorial. With the help of a remote personal tutor, Katarina learns from the tutorial and then takes on-line tests. The results are emailed to her tutor who contacts her to discuss progress.

Katarina has pre-stored her contact details on her smart card which holds her details on its microchip. The smart card makes form filling on interactive television a simple process.



Because Katarina cannot move about easily, her television based system has been programmed to allow her to control room temperatures and lighting; also the opening and closing of windows and to help answer the telephone. Katarina can also see other parts of her house and garden. She can see who is at the door and talk to them before allowing them in, or possibly calling for assistance.



Since Bill has a hearing loss, he cannot always hear the softer sounds on a television. He has found that it does not help to increase the volume because the loud sounds can become too loud, but this problem can be overcome by using an audio filter which amplifies soft sounds but not the loud signals.

He has also found it helpful to switch to 'clean audio' which eliminates non-essential background sounds on television programmes. When this feature is not available, he uses the sign language facility which appears in the corner of the screen.

# At home . . . Enabling people to live independently . . .

It is of great social concern to provide better systems that will enable elderly people and people with disabilities to live as safely and independently as possible within their own homes.

To provide a safe home environment for a person who has low vision, poor manual dexterity or difficulty remembering things, monitoring systems can turn off devices that have been left on too long, can emit warning alerts, measure temperatures, watch for movements in a room and activate switches.

Privacy is important; but where alerts are triggered, cameras can help relatives or care professionals to communicate and respond.

Help systems can activate reminders, control heating and entertainment systems and many other devices that will enable people needing care to live independently and yet feel safe and in touch.

Angela is 75, has a loss of central vision and finds it difficult to remember things. When she gets up in the morning sensors begin to activate systems that will help her with tasks. These are pre-programmed by a care assistant.

As Angela enters her kitchen in the morning the screen on her help system displays messages that tell her of any appointments she may have. Because she cannot see very well, the device also has audible output. Angela has control over this and can repeat messages, turn off or increase sound and also ask for assistance.

Angela feels secure with her help system. She has been involved with its set up and can ask for changes. The help system also enables her to communicate with her relatives. She and her family can see each other and speak on screen whenever they wish.



During the day the help system reminds Angela that she has medication to take. When she presses the OK button, tablets are dispensed. The help system records when the medication is dispensed and sends a message to the doctor when there is a need to re-order. Various alerts are programmed into the help system. Significant changes in routine will activate reminders or call for assistance.

The appliances in Angela's kitchen all have speaking controls. When Angela operates her cooker it speaks out confirmation of the requested operation and asks her to press a button or say "Yes". The appliances are permanently connected to broadband. Any fault in the appliance triggers a signal to the service centre or the home help personnel.

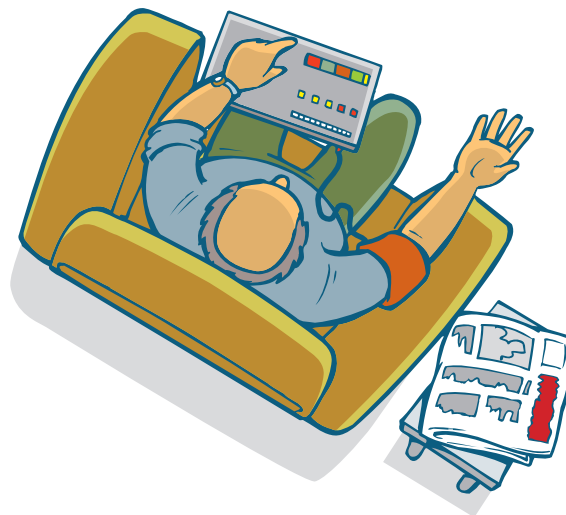
## Smart housing . . . Telecare and telemedicine . . .

Remote healthcare can help people who need frequent monitoring. In more remote communities health professionals can set up links with monitoring systems in people's homes and to devices worn by the person.

For example, a person with high blood pressure needs regular monitoring. A device can transmit information to a doctor's system. If this shows up changes and problems, the doctor or nurse can communicate instantly with the patient.

The concept of monitoring raises a number of ethical and legal issues. Any monitoring system should only be implemented with the full agreement of all parties involved including close relatives.

Jurgen is an elderly man who wears a heart monitor. He also has diabetes. The monitor transmits recordings to his nearest hospital and health centre which is 80Km away. Once a week his doctor is in contact via Jurgen's interactive television, so that they can see each other. Jurgen has a medical monitoring device that he puts on his arm. The doctor then asks Jurgen to carry out simple procedures that help check his blood pressure, heart rate and other simple tests.

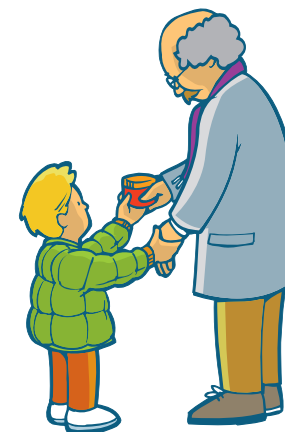


Jurgen's grandson is very allergic to certain trace food elements. To test foods, the barcode or RFID tag can be read by Jurgen's health monitor. This links to a database that gives an instant response. Actual food samples can also be placed on a test device which sends readings to the database. Several families in this remote village use this for allergy testing.

Jeanette is a social worker who has a wide range of people under her care. Each of these people has been set up with an information logging system that sends information to Jeanette's computer. This enables her to receive a wide range of information that will enable Jeanette to help her clients manage their daily lives. Each information stream is set up to meet the individual's needs. For example, some of her clients are intellectually impaired and have difficulties managing their money. Jeanette can manage and monitor a client's electronic purse, with their permission. She can also pay clients' utility bills, monitor accounts and process their benefits - all managed on line.

For clients who have a drink problem, or who do not look after themselves, she can respond to electronic purse alcohol purchases or she may notice they are not purchasing food. Jeanette has another client who has schizophrenia; a GPS tag enables Jeanette to check this person's location.

Each client's information tag can be set up differently, enabling Jeanette to spend time at her desk reviewing the information. When she is out visiting her clients her mobile phone receives any alerts to which she must respond. When Jeanette is on holiday the system is transferred to a colleague who has all Jeanette's records at his fingertips.



## At work . . . In the office . . . Operating machines . . .

To be able to work and be employed it is essential for most people to interact and hold conversations with others as easily as possible. Technologies such as the internet and mobile devices have made it easier for people to work in many new ways. These technologies can also help people with disabilities communicate in ways that allow them to fully integrate into the world of work.

Bill, aged 34, is a specialist lawyer with a young family. He has a severe hearing loss, but at work he has to discuss complex situations with others.

Bill can lip-read. His computer converts spoken words into an 'avatar' that appears on his screen alongside a smaller view of the person speaking. An avatar is a computer generated face with exaggerated facial expressions. Bill's computer can record conversations so that he can re-run them.

Bill also has a mobile phone that searches for any nearby alarm systems. If a fire alarm is triggered, Bill's phone vibrates and gives visual signals.

Bill works with James who is colour blind. James has software on his computer that converts the coloured charts Bill produces to show colours that James can distinguish.



Another colleague in a different part of the world is blind. She uses her phone to listen to verbal descriptions of James' diagrams.

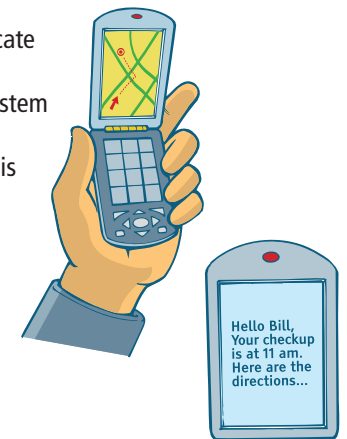
Elizabeth has impaired vision, hearing and poor manual dexterity. She works in a local government office. Speech recognition systems throughout the building allow Elizabeth to give spoken commands to office equipment. Room temperatures and ventilation are also controlled from voice activated equipment.



The office equipment also has screen displays that can show animated tutorials. Employees can run tutorials that have large print, speech output or use different languages.

All of the equipment in the offices is linked via broadband to allow the manufacturers to run diagnostic tests. An on line engineer can fix problems or arrange to visit.

Bill uses his mobile video phone to communicate in sign language via an automated service to book an appointment with the dentist. The system recognises sign language and converts it to speech for the dentist. The dentist's response is converted to sign language or text and then relayed to Bill.



## At work . . . At meetings . . . Safety and security . . .



Elizabeth and her colleagues use their mobile phones to buy from the snack machines and for meals in the staff canteen. The charges are added to their phone bills.

Their mobile phones also have a feature which allows security access to the building. Biometric recognition of their fingerprint ensures that if the phone is lost no other person can use it.

The linking of staff mobile phones allows the security staff to use an emergency monitoring system which shows where in the building staff are situated; especially those who have disabilities. If an alarm occurs all staff receive an immediate message on their mobile. Where an employee has a hearing difficulty their mobile will link to a visual and tactile alarm which they wear on their wrist.

All staff are required to attend health and safety training courses. For staff with disabilities this has been problematic, but a combination of remote support services enable most of them to fully participate and keep up with their colleagues.

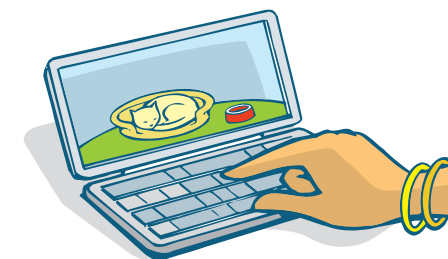


When Helen, who is blind, visits other offices she is expected to use any available computer. She inserts her smart card into the reader; this automatically configures the terminal to her needs and downloads her screen reading software.

Helen's boss has a severe hand tremor. When he gives a presentation he uses gestures to instruct the projector to advance to the next slide.



Salima has pets at home. One of her cats has not been well. She does not want to take time off work so uses the internet connected to cameras at home to see and hear if all is OK.



When dealing with numerical information, Helen uses a voice recognition system to convert the speech of her colleagues onto a Braille display. This is stored in memory so that Helen can read it again. When Helen is busy she uses the automatic abstracting system to reduce the quantity of Braille text.

## Out and about . . . In the locality . . .

For many people with disabilities travelling can be a daunting process. Some people with disabilities are not able to respond quickly to changes in circumstances. For example, changes in weather, cancellation of trains and buses, traffic delays and detours can result in a person needing more information to be able to make appropriate decisions.

Margaret is 48 years of age. She is physically impaired. When at home Margaret can access an interactive screen to find out when the next bus into her village is due. Her screen shows where the buses are and when they will arrive. Margaret needs this to avoid long waits at her bus stop which has no shelter.

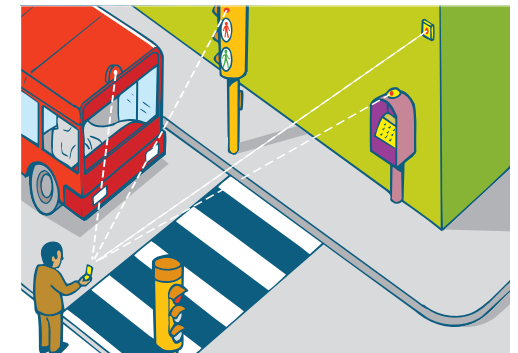
In a town, Margaret's friend Katarina can use her mobile to request information about local facilities, including whether they are accessible to her. Her profile, stored on the phone, includes the turning circle of her electric wheelchair, so restaurants can be selected which meet her needs.



At a general election, Margaret has difficulty in going to a voting station. She prefers to use her mobile phone, which incorporates fingerprint recognition, to register her vote.

David is a young man who is intellectually impaired. Every day the electronic purse in his mobile phone is automatically topped up to a pre-determined amount. The phone incorporates a biometric fingerprint sensor so that David does not need to remember any security codes. David uses his electronic purse to pay for his incidental expenses.

His family pre-programme his diary into his phone. During the day it activates reminders. It also relates these to global positioning so that David's family can be alerted to help if anything seems to be wrong.



Mario, who is partially sighted, wants to cross the road at a light-controlled crossing. He uses his mobile phone handset with Bluetooth to indicate that he wants to cross the road and needs more time than normal to complete the crossing. The phone informs him when it is safe to cross, and the destination of the approaching bus.

## Out and about . . . Further afield . . .

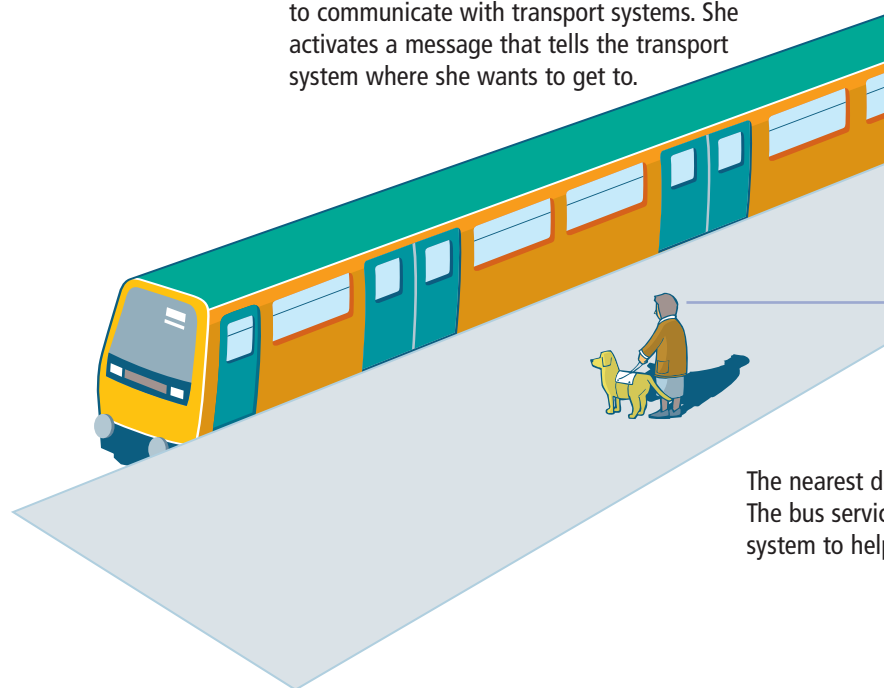
Even if improved forms of communication help people with disabilities integrate better into working environments, getting to and from work can be a major barrier to many. Transport systems can use sophisticated technologies to provide real time information to passengers.

Margaret uses an integrated transport information service to plan her journey which may involve using taxi, bus, tram and train. The service knows her mobility needs so only proposes appropriately accessible transport. If there is a service disruption, she automatically receives a call advising her of an alternative accessible route.

David has an intellectual impairment and finds it difficult to remember how to operate machines. His mobile phone has been programmed to allow him a simple number of reduced options for the ticket machine at his local railway station. The machine and his mobile automatically communicate. The screen on the machine displays the options. David then makes his choice. The cost of the ticket is charged to his mobile account.

David always comes home from visiting a close friend using the underground. Unfortunately, today the station is closed. He rings a service centre and they guide him, with the help of his mobile video phone which incorporates positioning information, to the bus stop and ensure he catches the correct bus.

Helen is blind. Her mobile phone is programmed to communicate with transport systems. She activates a message that tells the transport system where she wants to get to.



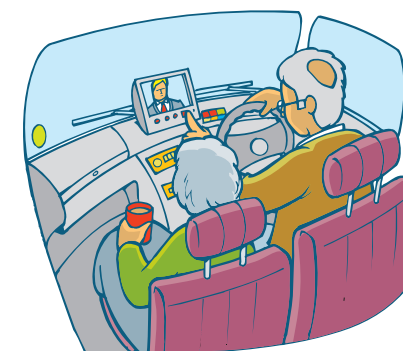
Helen's earpiece tells her which train this is.

The nearest door 'beeps' to help Helen locate it. The bus service that Helen also uses has a similar system to help people with disabilities.

When on the train Helen will be able to hear the name of each station as it approaches. When she reaches her station the doors will 'beep' so that she knows which side to get off. The driver will be alerted and will allow more time and assistance.

If Helen experiences difficulties or gets lost, she can activate a help facility through her mobile phone. This transmits her position to a transport service centre showing exactly where she is. She can then be talked through directions to put her back on her journey.

Mary and Jim are elderly. They often drive to visit their extended family. They have a fear of breaking down in remote places. However, they are reassured by the system in their car which if they were to breakdown would enable them to call for assistance. Their position would automatically be relayed to the help service. A help screen in the car enables them to stay in communication whilst they wait.



## Out and about . . . Leisure and entertainment . . .

If a person becomes disabled it does not mean that they have to stop all of the leisure activities they previously enjoyed. For many people, their quality of life is measured by their ability to get out and about and take part in everyday society. New telecommunications systems and services can open up many new and helpful ways to allow people with disabilities to participate in normal activities.

Because Helen is blind she has a special mobile phone that searches for public facilities such as toilets, bus stops, and ticket machines. When Helen is near one of these it relays a message to her handset; she can then request further information. If it is a bus stop or ticket machine she receives information that will help her make choices. Tickets can be purchased and sent to her phone which activates and opens barriers.

One of the major shopping centres that Helen likes to visit has a short-range radio system. As she walks along the shopping arcades her earpiece provides her with an audio description of each shop. When she enters a shop the audio description tells her the layout of the shop and the location of such things as the pay desk.

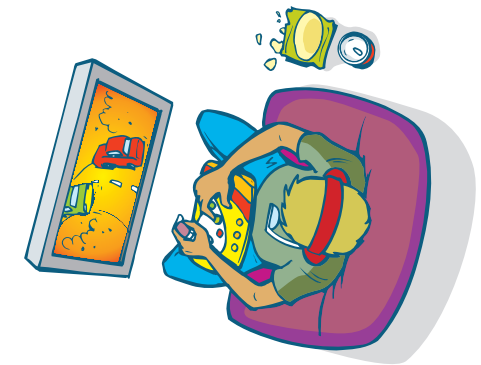
Helen's friend David is intellectually impaired. When he visits his local sports centre his membership smart card requests staff to talk slowly and clearly. This saves embarrassment for David.



Mario, who is partially sighted, does not have internet access at home. To use the internet he visits the public library. He inserts his library card in the computer terminal, and the terminal is automatically configured to his needs, with large icons and large characters in his preferred typeface. When he removes his card, the terminal reverts to its default settings.

Aasif is 12 years old. He is deaf. He uses his games station with its mobile phone technology to link with his school friends. They often play against each other remotely on the games station. This also has a video link that enables Aasif's friends to contact him to arrange to meet up. They can text him or have their speech converted into text that Aasif can read.

Aasif also has spectacles that project text into his vision. The spectacles link to his games station and his television. When at the cinema they also link to the film and allow him to read the subtitles.

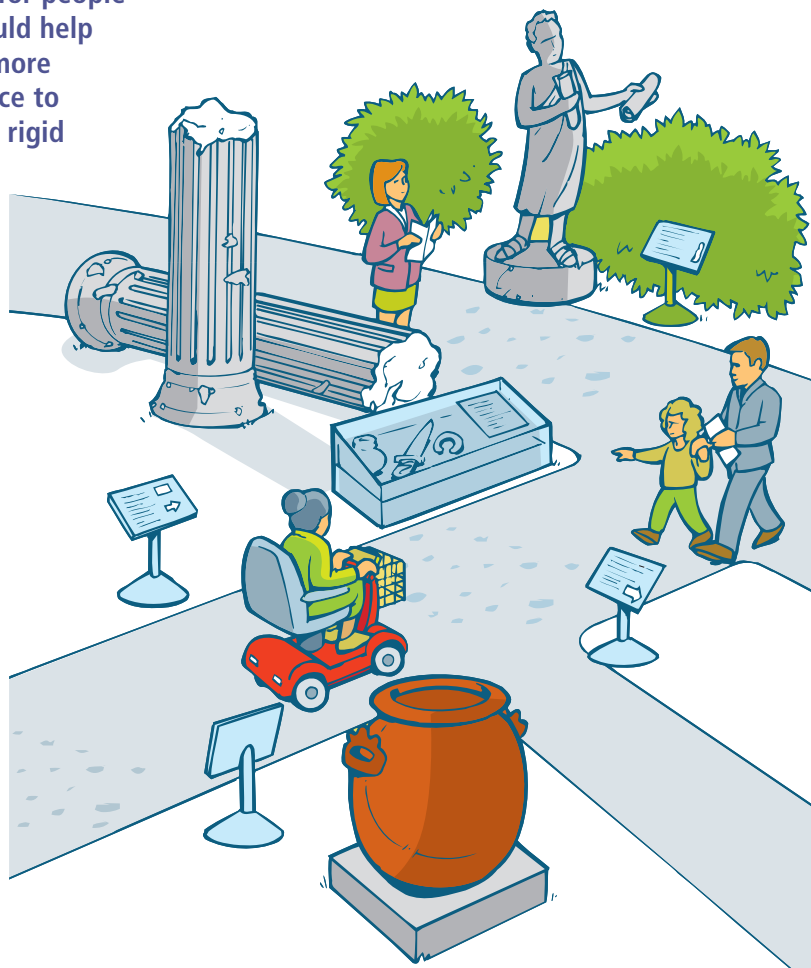


Mary finds that her minor impairments in vision, hearing and manual dexterity do not significantly restrict her ability to communicate or use her mobile phone. However, she is grateful that her mobile phone handset incorporates a feature that allows it to act as a universal remote control for a wide range of devices and terminals - from her central heating controller at home to the local car park ticket machine or the vending machine at the local sports centre.

## Out and about . . . Away from home . . .

Everybody can have problems when they are in an unfamiliar environment. These problems tend to be more severe for people with disabilities. New telecommunications services could help with these problems, allowing disabled people to be more spontaneous with their choices and have the confidence to travel independently without having to make detailed rigid itineraries a long time in advance.

Katarina, who is physically impaired and uses a wheelchair, is staying in a large city hotel. She uses a remote control to call the lift. The remote she uses is supplied by the hotel and links to her mobile phone. This instructs the lift to allow more time and give audible and visible indicators. Katarina feels safe in this environment. She knows that staff can be called to help her and also will know where she is if an emergency occurs.



When Katarina visits a museum she uses an earpiece that picks up the signal from a radio frequency tag in each exhibit. This provides her with spoken descriptions of the exhibits in her native language. In the museum restaurant, Katarina's mobile phone triggers audio output of the menu in her preferred language.

Angela, who is blind, has problems using the television in her hotel room. She can use a universal remote control which has been configured with speech output and tactile markings on the keys. This enables Angela to use the interactive television services since menu items can now be selected by number rather than moving the highlight bar on the screen.

Another feature that Angela finds useful whilst away is to use her mobile to link to her TV hard-disc recorder at home. This allows her to instruct her TV to record a television programme including audio description. Audio description is where a description of the action is inserted in gaps in the dialogue.



### Will new telecommunication services benefit people with disabilities ?



Some of the services and technologies described in this publication will be commercially profitable and thus come quickly into use. Other services may only require a modest additional feature to make them viable; the costs of these additions may be covered by the extra sales generated. However, many of the services will not be developed or implemented without pressure from those who need them.

To influence commercial and regulatory organisations will require systematic and quantified analysis of the varied needs of people with disabilities. It is also important for disabled consumers to become more aware of what services are now available and what they could realistically call for in the future.

In some areas of development the lack of agreed standards, at national or international level, will hinder the implementation process. Since standardisation can be a slow process, it is important for all those with influence to initiate the process in good time.

There may be a requirement for legislation or mandatory regulation if a service is not commercially viable in the short term; however legislation and regulations can stifle innovation by leading service providers to provide the minimum required for compliance.

The take-up of new services will be influenced by the methods adopted for marketing, which need to be appropriate for the relevant group of disabled customers.

To successfully design and make the best of future technologies so that people with disabilities can benefit, it is important for all those with influence, including the designers of telecommunications and services, to think more widely about the needs of all people and thus to design with innovation and insight.

## Sources of further information . . .

### European Telecommunications Standards

**Institute** - [www.etsi.org](http://www.etsi.org)

Contains many standards and project reports related to human factors aspects of telecommunications.

### Guidelines for Accessibility of ICT Systems -

[www.tiresias.org/guidelines](http://www.tiresias.org/guidelines)

Information for designers of information and communication technology systems.

### Include - [www.stakes.fi/include](http://www.stakes.fi/include)

Information for designers about inclusive design of telematic devices and services.

### Mapped - [www.bmtproject.net/mapped](http://www.bmtproject.net/mapped)

European project which aims to provide users with the ability to plan excursions from any point to any other point, at any time, using public transport, their own vehicle, walking, or using a wheelchair, taking into consideration all their accessibility needs.

### Trace Center - [www.trace.wisc.edu](http://www.trace.wisc.edu)

The main American website containing information on designing telecommunication services for people with disabilities.

### Universal Remote Control - [www.myurc.com](http://www.myurc.com)

Explains the range of potential applications for a universal remote control.

### Wireless RERC - [www.wirelessrerc.gatech.edu](http://www.wirelessrerc.gatech.edu)

Research on universal access to mobile wireless technologies for people with disabilities.



### The COST Programme - [www.cordis.lu/cost](http://www.cordis.lu/cost)

COST is an intergovernmental European framework for international co-operation between nationally funded research activities. COST creates scientific networks and enables scientists to collaborate in a wide spectrum of activities in research and technology. COST activities are administered by the COST Office.



### COST 219ter - [www.cost219.org](http://www.cost219.org)

The main objective of COST 219ter is to increase the accessibility of next generation telecommunication network services and equipment to elderly people and people with disabilities by design or by adaptation when required. In cases where this cannot be achieved, the project will promote the establishment of appropriate supplementary assistive services and equipment. The objectives are to:

- Extend the existing COST 219 website for designers to better understand consumers and their requirements, so that many more people with disabilities and elderly people can be catered for in mainstream design,
- Support the exchange of information on inclusion and accessibility issues so that these can be freely explored with developers, researchers and representatives of the telecommunications industries and service providers,

so that

- Disabled and elderly people can share in the benefits of new mobile communication systems.

## PhoneAbility

### PhoneAbility - [www.tiresias.org/phoneability](http://www.tiresias.org/phoneability)

PhoneAbility is the independent UK focal point for telecommunications and the needs of disabled and elderly people. The group acts as a catalyst in this area by:

- Interacting with a range of relevant organisations,
- Publishing both practical guidelines and policy documents,
- Organising conferences and seminars on telecommunications and disability.

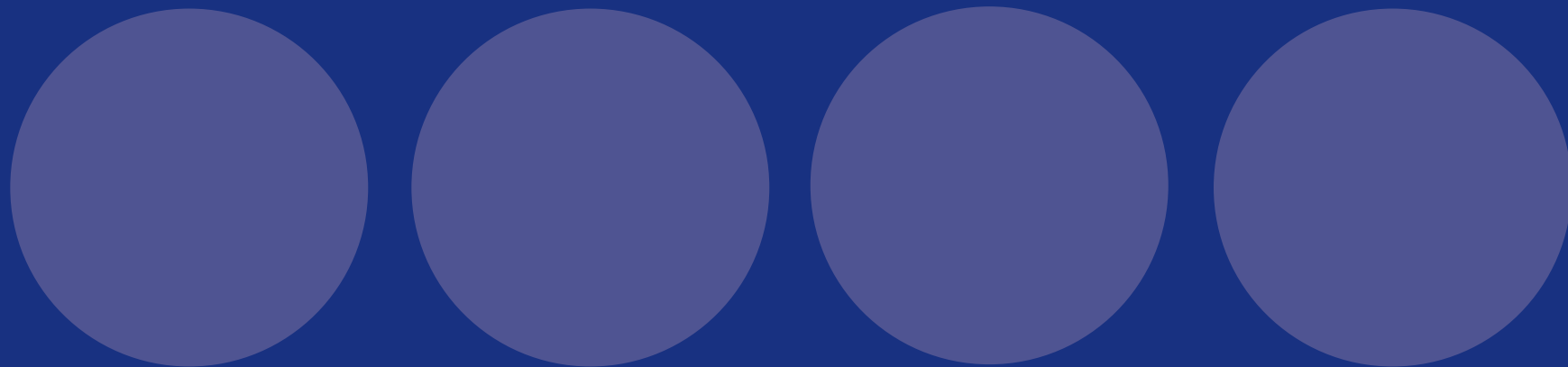
It also acts as the UK reference group to COST 219ter.



### ASK-IT - [www.ask-it.org](http://www.ask-it.org)

The ASK-IT European project is developing integrated services for people with special needs. These services include the provision of relevant and real-time information - primarily for travelling but also for use at home, at work and for leisure. The main aims are:

- To allow easy and consistent access to a range of content providers using internet-based systems,
- To offer support to users based on knowledge of their position, plans and preferences,
- To provide information to the user in their preferred modality (eg speech output).



**Consumers, designers, service providers and regulators need to work together to develop and implement new telecommunication services of practical benefit to people with disabilities.**



COST is supported by  
the EU framework  
programme



Accessibility for All to  
Services and Terminals for  
Next Generation Networks