Increasing the IMPACT of assistive technology

Vision impairments
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>VISUAL IMPAIRMENTS AND ASSISTIVE TECHNOLOGY SOLUTIONS</strong></td>
<td>5</td>
</tr>
<tr>
<td>1.1 DIVERSE IMPAIRMENTS AND A WIDE RANGE OF TECHNOLOGIES</td>
<td>5</td>
</tr>
<tr>
<td>1.2 PREVALENCE OF VISUAL IMPAIRMENT</td>
<td>8</td>
</tr>
<tr>
<td>1.3 CAUSES OF IMPAIRMENTS</td>
<td>10</td>
</tr>
<tr>
<td>1.4 IMPACTS OF VISUAL IMPAIRMENTS</td>
<td>12</td>
</tr>
<tr>
<td>1.5 ASSISTIVE TECHNOLOGY (AT) FOR VISUAL IMPAIRMENTS</td>
<td>16</td>
</tr>
<tr>
<td>1.6 BEING AN ASSISTIVE TECHNOLOGY INTERMEDIARY (ATI)</td>
<td>29</td>
</tr>
<tr>
<td><strong>SPOTTING UNMET NEEDS</strong></td>
<td>35</td>
</tr>
<tr>
<td>2.1 AT HOME</td>
<td>35</td>
</tr>
<tr>
<td>2.2 DURING A MEDICAL CONSULTATION</td>
<td>38</td>
</tr>
<tr>
<td>2.3 IN HOSPITAL</td>
<td>41</td>
</tr>
<tr>
<td><strong>REFERENCES</strong></td>
<td>44</td>
</tr>
<tr>
<td><strong>GLOSSARY</strong></td>
<td>46</td>
</tr>
<tr>
<td><strong>FACTSHEETS</strong></td>
<td>47</td>
</tr>
</tbody>
</table>
INTRODUCTION

This module of the IMPACT courseware focuses on the assistive technology that can support people with visual impairments.

The module begins with an overview of vision and visual impairments, the kinds of assistive technology that can help and how assistive technology can be made available to people who need it.

This is followed by an outline of how health and social service professionals in various settings can identify unmet needs for assistive technology for people with visual impairments.

By the end of the module you will have had an opportunity to understand:

• the extent and consequences of the main visual impairments;
• the extensive range of assistive technology that is currently available in this area;
• how people with visual impairments acquire - or sometimes fail to acquire - the assistive technology they need, and
• the important role health and social service personnel can play in ensuring that needs are adequately met.

In particular, you will have been shown the key role that health and social service staff can play as ‘assistive technology intermediaries (ATIs) ’ in three client settings where unidentified visual impairments and/or unmet needs for assistive technology relevant to visual impairments can be picked up:

• in the home environment (e.g. a visit from a community nurse, social worker or home help);
• in general medical consultation (e.g. visit to a family doctor);
• at the hospital (e.g. as an in-patient or at the point of discharge).

ASSISTIVE TECHNOLOGY INTERMEDIARIES (ATIs)

Remember from the Introductory Module....

An ATI is a health and social service professional who, whilst not being a specialist in assistive technology, nevertheless helps to ensure that his or
her clients acquire the assistive technology that they need. Being an ATI means watching out for unmet needs arising because of disability or because of age-related functional problems, and taking appropriate action when such needs are spotted.

Such action may include helping people to acquire assistive technology themselves, referring them to an occupational therapist or other specialist in assistive technology, or taking a more direct role yourself. All health and social care professionals dealing with disabled or older people should include within their competencies the ability to act as an ATI.

Throughout this module you’ll follow the cases of Nicole and Eleen, both of whom you have already met in the introductory module. You will also meet some new cases that illustrate particular points as the need arises.

Nicole

Nicole is an 82 year old woman, living in Eindhoven, a medium-sized city in the southern part of the Netherlands. As a former college lecturer, she has always had an active life with a good network of friends and a substantial involvement with local associations.

Since the last couple of years she has difficulties with walking. However, she refuses to give in and has acquired a rollator: “With this tool, I am able to do many things I couldn’t do otherwise, like shopping or attending the repetitions of the local theatre group, … I couldn’t manage without my rollator any more”.

Nicole refuses to move to a service flat or residential care. She has been living in this flat for a great many years and it is still full of memories of her husband, who died four years ago. Nicole still likes to go out and enjoy the company of her friends over a nice cup of coffee on a nice spring afternoon. At home, she likes to watch television or do some embroidery. Most of all, she enjoys reading a good novel.
1 VISUAL IMPAIRMENTS AND ASSISTIVE TECHNOLOGY SOLUTIONS

This section starts with some key facts about visual impairment in Europe today. It supplies epidemiological data about visual impairments, explains the workings of the eye, and shows how visual problems arise. The consequences of visual impairments for people who have them are outlined and some of the main signs that indicate a person may have a visual impairment are described.

This is followed by an overview of the main types of assistive technology that can help people with visual impairments, and an account of how people with visual impairments (at least to those whose needs are recognised) typically get access to assistive technologies.

The section finishes by reminding you about the competencies that are required of health and social service personnel to enable them to act as effective assistive technology intermediaries linking people with unmet needs to the services that can help them.

1.1 Diverse impairments and a wide range of technologies

There are many sources of visual impairment. It can result from genetic conditions, infections, physical conditions or trauma. It can be present from birth, can develop at any time, and may or may not be progressive.

A number of different conditions affect the eye and the effects of these vary considerably - as does the degree of visual impairment caused by them. And, as with other impairments, visual impairment varies from person to person and from onset to full development in the case of each individual.

Most people with visual impairments experience partial vision loss of different types and varying degrees, and a smaller number experience complete vision loss. The terms ‘blind’ and ‘partially sighted’ are often used to describe the degree of vision loss a person has.
Blindness is used to refer to a substantial and permanent loss of sight and partial sight refers to a less severe loss of vision. There are various legal definitions of the degrees of vision loss and these can affect eligibility for public services and financial and other supports.

Many people think that blindness means seeing nothing at all. In fact only 18% of blind or severely visually impaired people have no useful sight. Of the visually impaired people with useful sight, the amount of residual sight and what they can see varies greatly, even between people with the same diagnosis.

A minority of visually impaired people can distinguish light, but nothing else. Even then, if you can perceive light you can locate the direction of a window and place yourself within the context of a room.

Some people have no side vision; others have no central vision. Some have tunnel vision, while others see everything as a vague blur, or as a patchwork of clear and fuzzy areas.

Most eye conditions can be corrected through the use of spectacles or contact lenses. However, there are a significant number of people whose visual problems can’t be entirely overcome in this way. The main focus in this module is on visual problems that cannot be corrected with the use of spectacles or contact lenses.

The practical impact that visual impairment has on individuals can also vary greatly. Some people may have enough sight to read large print and, in some cases even print at standard point sizes, but may have difficulty crossing the road.

The effect of a given impairment on individuals will vary greatly, depending on

- the particular condition
- how far it has progressed
- the suitability of the environment the person inhabits
- the availability of assistive technologies and other supports
- the coping skills of the individual.

The role of technology

Assistive technology supports people with visual impairments either by enhancing their residual vision (more than 80% of individuals who have visual impairments retain some usable vision), or by facilitating perception through other media, especially sound and touch.
Technology can give privacy

Using assistive technology, people with visual impairments can read and write, carry out daily living tasks independently, and continue to enjoy a good quality of life. Apart from these direct practical benefits, assistive technology can also provide a solution to some of the less obvious but critical implications of blindness. As noted by John Gill of the RNIB in the UK “lack of privacy is one of the greatest deprivations caused by blindness.” This is because blind people have usually had to rely on other people to help them with everyday matters, such as by reading personal letters to them. Assistive technology can reduce this dependence on others.

Of course, we must also keep things in perspective and not expect technological solutions to provide a panacea for the challenges posed by visual impairments. In the words of John Gill again, it would be “unwise to look for purely technological solutions to human problems”.

Over the years, traditional methods such as canes, personal readers, Braille machines and tape recorders, have been the assistive technologies that contributed significantly to the enhanced mobility, independence and quality of life of people with visual impairments.

Recently, a range of new equipment, deployed at home and at work, has supplemented these aids to everyday living. Examples include miniature video cameras that read printed material and reproduce it in magnified form on a monitor or TV screen, software and speech output devices to read aloud the text on computer screens, and Braille terminals for personal computers.

In fact, blind and visually impaired people can now potentially access a very wide range of formerly inaccessible activities, through spoken messages (natural or synthetic), through tactile markings and readings, through enlarged or enlargeable characters and other solutions.

The challenge is to ensure that these new technologies reach the many people who could benefit from them but who aren’t yet in a position to do so - because their needs aren’t recognised, or because they aren’t put in touch with the assistive technology services that
can help them, or, most critically, simply because they can’t afford them.

### Context activity

Write down as many examples of assistive technology for visual impairment as you can think of. Your answer could include products that already exist and more futuristic ones that you imagine could be useful for people with visual impairments. If possible compare your list with someone else’s.

### 1.2 Prevalence of visual impairment

The World Health Organisation (WHO) estimates that there are approximately 148 million people with visual impairment worldwide.

The WHO reports the following facts about visual impairment:

- About 38 million of the people with visual impairment are blind; the other 110 million have low vision or partial sight and may be at risk of becoming blind.
- Nine out of ten blind people live in the developing world.
- While there are many forms of visual impairment, the main causes of visual impairment differ between the developed and the developing world.
- In the developed world, most impaired vision is caused by age-related conditions, such as cataract and macular degeneration.
- In developing countries, most blindness is caused by malnutrition and inadequate health care provision.
- More than 80% of all blindness could be prevented or cured by applying existing knowledge and technology.

There are different estimates for the numbers of people with visual impairment depending on which definitions are used. In the EU, for example, the estimates for the percentage of the population having visual impairments range from about 2% to 3%, representing between 8 to 12 million people. Of these (based on UK estimates from the RNIB), about 2% are aged 14 years or under, 9% are between 15 and 59 years old, 19% are between 60 and 74 years old, and 70% are 75 years or older.
So, visual impairment is largely an age-related phenomenon and, as more people are living to an older age, the number with visual impairments is steadily rising.

### Context activity - visually impaired people that you know

Think about people you know who have a visual impairment and write down your answer to the following questions:

- How do you know these people have visual impairments?
- What is the severity of their visual impairments?
- What age categories do they fit into?
- How does this compare with the statistics provided in this section; try and explain any differences.

### Research activity - how many people have visual impairments in your country?

There are some statistics in this module on visual impairment in Europe. Find statistics showing how many people in your country have visual impairments. Try to gather figures that also relate statistics on visual impairments to other variables such as age or gender.

Visual loss is one of the most frequently reported disabilities amongst older persons. Although precise data is lacking, it is estimated that about one in nine persons aged 65 years old and over and one in four persons over 85 years is severely visually impaired, where ‘severe visual impairment ‘ is defined as the inability to read newspaper print - a loss of vision sufficient to interfere with many aspects of daily functioning.

As people get older their eyes start to age and they may not function as well as they used to. The retina of a typical 60-year old person has only one third of the light reaching it, compared to the retina of an average 20-year old, even without a specific medical condition.

Geriatric blindness is often neglected because loss of sight among elderly people frequently accompanies more obviously debilitating
health problems. Most of the age-associated losses in hearing and vision aren’t easily traced to diagnosable medical problems, and functional vision may be a better indication of a person’s ability to use vision in performing daily tasks. The factsheets at the end of this module contain more information on this subject.

For example, susceptibility to visual glare is not a recognised medical problem unless it is an accompaniment to cataracts. And, two thirds of older people who are severely visually impaired also have at least one other serious disability or chronic illness.

Review activity

What is the main message of this section? Choose the best answer:

- Visual impairments are much more prevalent in developing countries.
- Visual impairments can arise for many different reasons.
- Visual impairments are widespread and are increasing as the population ages.

1.3 Causes of impairments

The eye

Parts of the eye

*Lens* - the transparent structure inside the eye that focuses light rays onto the retina.

*Retina* - the nerve layer that lines the back of the eye. The retina senses light and creates impulses that are sent through the optic nerve to the brain.

*Macula* - a small area in the retina that contains special light-sensitive cells. The macula allows people to see fine details clearly.
**Optic Nerve** - the nerve that connects the eye to the brain. The optic nerve carries the impulses formed by the retina to the brain, which interprets them as images.

**Cornea** - the clear ‘front window’ of the eye. The cornea transmits and focuses light into the eye.

**Iris** - the coloured part of the eye. The iris helps regulate the amount of light that enters the eye.

**Pupil** - the dark centre in the middle of the iris. The pupil determines how much light is let into the eye. It changes size to accommodate for the amount of light that is available.

**What causes visual impairments?**

There are many causes of impaired vision, including genetic conditions, accidents, disease and deterioration due to ageing. Each of these can damage the eyes, or some other part of the visual system.

Figures from the UK indicate that 200 people a day injure their eyes at home and, of these, one third are children. The most common eye accidents in the home are those that happen during home maintenance activities e.g. car maintenance or gardening.

The kind of impaired vision that results from damage to the eye depends to a large extent on the location and extent of the damage.

**Louis Braille**

Louis Braille was the son of a saddler. When he was three and playing in his father’s workshop, he tried to cut a piece of leather with a sharp pruning knife, which slipped and went into his eye. This resulted in his losing the sight in one eye. Later, infection spread to his other eye and he lost his sight completely. One consequence of this personal tragedy was that it led him to develop the Braille notation that is used by millions of visually impaired and blind people today.

In Europe, as already mentioned, visual impairment is found predominantly amongst older people. There are four major eye diseases associated with visual loss amongst this group:

- macular degeneration
- cataracts
- glaucoma
- diabetic retinopathy.

These eye diseases account for 85 per cent of visual impairment in older people. Vision problems can also arise as a result of stroke (e.g.
hemianopia). More information about these conditions can be found in the factsheet on main causes of visual impairments.

Nicole

Nicole enjoys reading but unfortunately her eyesight is getting worse. Recently she started to use talking books, especially when her eyes were feeling tired: “Talking books are really useful I can listen and knit at the same time.”

Review activity

Write down the main causes of visual impairment and discuss their characteristics. You will need to consult the factsheet on the main causes of visual impairments to answer this.

1.4 Impacts of visual impairments

Eleen

Eleen suffers from macular degeneration - she has no central vision and only fuzzy peripheral vision. She is legally described as blind and finds it impossible to read or to drive. She has found ways of managing by relying on her residual vision. The loss of central vision has an immediate effect on distance evaluation. Whether reaching for something, putting something down on a surface, or determining the position of one object in relation to another, the loss of depth perception makes everyday tasks very difficult. For example, Eleen found that the food on her plate was not where she thought it was, and her fork went into her mouth empty. She reached for the pitcher of iced tea and ended up clutching a handful of empty air. This loss of depth perception causes Eleen to feel very insecure.

Eleen’s loss of central vision also affects depth perception in walking and her balance is no longer as steady as before. She finds it difficult to walk in a straight line for more than a few yards.

It is often easy to miss the visual problems that people have because these do not stand out in any obvious way. Very often people with visual problems seem to be able to manage most tasks, like getting around, dressing and eating without too much difficulty.

Also, unlike other physical ailments, eye disorders seldom cause pain. In most cases the onset is slow, progressive and can go unnoticed for months or even years.
Aldous Huxley

The famous author of Brave New World lived in Surrey, in the South of England. While a schoolboy at Eton, he contracted an eye infection and became almost completely blind. Although he regained some vision later on, he remained severely visually impaired for the rest of his life. This led him to move to California because he found the light there better for his eyes. Huxley wrote The Art of Seeing, which anybody interested in vision and visual impairment should read.

Although many forms of visual impairment will remain undetected, unless the individual has a full eye test, there are a variety of practical ways of picking up fairly obvious problems.

Direct indications

A client may complain of particular vision problems such as those outlined in the Reference Picture Table given here. This table provides a quick guide to the symptoms and difficulties associated with some of the main eye conditions.

Indirect indications

Clients may report (or you may notice) that they are experiencing functional difficulties that could be indicative of an underlying vision problem.

Be alert if a person has difficulty in the following areas:

- reading
- writing
- mobility (e.g. bumping into things, not going out)
- recognising faces
- basic activities of daily living (e.g. eating, dressing, self care)
- playing games or participating in hobbies (e.g. sport, gardening)
- watching TV
- instrumental activities of daily living (e.g. banking, shopping, cooking, cleaning)
- caring for others.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Symptoms and difficulties associated with condition</th>
<th>What the person sees</th>
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<tbody>
<tr>
<td>Normal vision</td>
<td>What the person with normal vision sees</td>
<td></td>
</tr>
<tr>
<td>Condition</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Macular degeneration</td>
<td>Impairs central vision. Difficulty with reading, writing, recognising faces. Sensitivity to light in some cases</td>
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<tr>
<td>Glaucoma</td>
<td>In advanced cases it damages peripheral vision leaving only central vision. Early signs include seeing an arc above or below objects. Difficulties with any tasks that require peripheral vision. Only seeing objects directly ahead. Difficulties seeing in dim light.</td>
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<tr>
<td>Cataract</td>
<td>Clouding of lens. Blurs the field of vision. Poor vision in bright light. People with severe cataracts may only see shapes and bright colours. Depending on severity, people may experience difficulties with reading, writing, leisure activities and activities of daily living.</td>
<td></td>
</tr>
<tr>
<td>Diabetic Retinopathy</td>
<td>Can affect the entire field of vision. Blind spots are common.</td>
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**Eleen**

Eleen finds it difficult to recognise people. Faces are a blur, even her own. She says: “When I look in a mirror, I see two dark spots for my eyes and a vague contour for my face and a white mass (my hair) above. When I look at other people, I see only an outline, possibly glasses if they wear them, and hair. No features, no expression. Someone talks to you, and all you see is a body with a head outline. When a person comes up to me I may recognise their voice but often I have to ask, who are you? In the beginning this made me very nervous.”
Implications of visual impairments

As you should now know, the effect of any individual impairment varies greatly, depending on the condition, its progress, the environment and availability of supports, and the coping skills of the person.

The first concern for people with visual impairments is that they do not experience unnecessary reductions in quality of life through difficulties in carrying out the daily activities that are important to them. As you’ll see in the next section, there are now many assistive technologies that can enable most activities to be carried out, even where total blindness occurs.

Another important concern about visual impairment amongst older people is that the gradual or abrupt reduction in independence that may arise will ultimately result in admissions to long-term institutional care that would otherwise be avoidable. As you’ll see, assistive technology has an important role to play in avoiding this.

In fact, even with little assistive technology many visually impaired people can manage so-called primary activities of daily living such as eating, bathing, dressing and toileting reasonably well. They may, however, have more difficulty in performing the instrumental activities of daily living, such as shopping and cooking, that underpin these basic ones.

Without assistive technology, of course, they may also find it difficult - or impossible - to read, write, watch television, or participate in other activities that are important for them.

A person with a visual impairment may also have difficulty handling finances and taking medications. These are two activities that, on their own, have a major impact on a person’s ability to live independently.

Also, blindness and low vision can compound many of the problems that vulnerable older persons are prone to, such as isolation, low income, loss of status and public understanding, and reduction of independence.

Many visually impaired people suffer from shock, fear and despondency in the initial stages of vision difficulties. For some, these feelings remain with them and can be compounded by feelings of isolation, resentment, anxiety and depression.

Some people experiencing vision difficulties withdraw from social activities and close friends. They can feel that they have lost control of their lives.
Eleen

Eleen told her social worker that she thought it was too much trouble for people to bother talking to her. Her social worker knew how important it was for Eleen to keep up her social contacts. He told her that she had a right to talk regularly with others and that everyone wanted to talk to her too. He encouraged her to try. He pointed out that if Eleen explained at once that she had some difficulty seeing and reminded people to identify themselves they would feel less nervous about approaching her as she would have made the first contact.

Review activity

Write down the most important consequences of visual impairments. Also, list some of the indications that can suggest that a person has vision problems.

Extension activity - vision simulation exercise

A good way to get a better understanding of what it is like to have a visual impairment is to undertake a Vision Simulation Exercise. The factsheet on the vision simulation exercise shows you how to do this. It is recommended that you undertake this exercise.

1.5 Assistive technology (AT) for visual impairments

As you have read there is now a wide range of assistive technologies to help people who are blind or partially sighted to take part in most activities. The particular solution recommended will depend on the degree of vision loss and the individual’s personal needs.

Someone with slight vision problems may manage by simply having good lighting installed, with strong contrasts for reading and seeing objects, while someone with severe visual impairment may require a range of specialised assistive devices or services.

Let’s look at some of the vast range of solutions that exist to enhance the lives of visually impaired people.

Firstly, let’s examine a number of mostly non-technical solutions or techniques. These include increased lighting, colour contrast and organising the environment and they can help visually impaired people use their remaining sight. They require little or no technology.

Then let’s look at assistive devices and services, classified according to the following categories:

- accessible printed material
• personal assistive devices
• adapted everyday items
• information and communication technologies (ICTs)
• future developments.

Research activity

Describe how you would go about finding out what equipment is generally available to visually impaired people in your country.

• Where do you think you can find statistics on the numbers of visually impaired people that have particular types of equipment?
• Can you find any catalogues of available equipment? Good sources may be from public agencies, organisations of, or for, visually impaired people, or private sector manufacturers, distributors or retailers.

Non-technical Solutions

When someone is visually impaired much can be done to improve their home in order to make it easier for them to get around it and to manage on their own.

Two major concerns for visually impaired people are to manage to do the things they did before and to prevent accidents or mishaps. There are many practical solutions that can help and that require no assistive technology, for example simply getting things organised, carrying out tasks much more carefully than before, and being persistent can help the visually impaired person become more competent around the home.

The main areas where practical adjustments can be made are:
• Organisation of the home (inside and outside)
• Improved natural and artificial lighting
• Improved use of colour contrasts
• Elimination of hazards
• Organising and labelling items.

Eleen

Eleen found that she kept knocking things over in the cupboard when she was putting the dishes away. She decided to reorganise her cupboards and work surfaces so that there were no tall items in front of smaller ones and she also started using touch to locate and identify objects. The improvement was dramatic and working in the kitchen became a pleasure again. However, given the habits of a lifetime, reorganising was not easy to do, and she often forgot the new arrangement, which she found frustrating.
Increasing the IMPACT of assistive technology
Vision impairments module, version summer 1999
Page 18 of 55

Practical tips on how to implement these solutions can be found in the factsheet on organising the home.

Accessible printed material

Printed material can be made accessible to people with visual impairments in two main ways - enlargement of text and provision of text in alternative media (sound or touch). Some of the more common solutions now available include:

- **Large print**
  Many visually impaired people can read using large print and many public bodies make use of straight, thick and large sans serif lettering, such as 16 or 18 point Arial when writing to visually impaired people.

- **Braille and Moon**
  Books are also available in Braille and Moon formats. These are special tactile interfaces - Braille uses a raised six-dot system to represent letters and Moon uses a raised graphical representation of letters. However, although useful, only a small minority of blind people can actually read these tactile languages.

- **Talking books and magazines**
  Books and magazines that have been pre-recorded onto audiocassettes or CD-ROMs provide a very useful solution for people whose visual impairments prevent them from reading. These have been provided as a special service for blind people for some time and there is now an increasingly wide range becoming available on the general market.

- **Electronic books and newspapers**
  Electronic books and magazines provide a newer solution in this area. These can be ‘read’ by blind people using speech synthesisers, either attached to personal computers or stand-alone models. To be truly useful, however, the lay out of text must take account of the particular needs of this type of reading, which is quite different to visually navigating through the newspaper. There are also services in some countries where electronic newspapers are broadcast over TV networks to be read by blind people with suitable equipment.

Personal assistive devices

The term personal assistive devices is used to refer to items of equipment that have been specifically designed as tools for use by people with visual impairments. Let’s examine them in terms of the functional problems that they solve.
Devices for improving vision

- Field expanders
  These are generally prisms or special lenses built-in to eyeglass frames. As the name suggests, they expand the field of vision when this has become narrowed.

- Telescopes
  Telescopes assist with distance vision. They may either be worn on the head or held in the hand, and they may be monocular or binocular.

Devices for reading

There are a number of reading aids that can make printed materials and text displayed on computers or other devices accessible to individuals who are blind or visually impaired.

- Typoscope
  A line of print can be easier to read when a typoscope, a piece of dark plastic or cardboard with a slit in it, is placed over the line, isolating it from the rest of the text. In some countries, this useful device can no longer be purchased and must be made by the user.

- Enlarging photocopiers
  The enlargement facility on a photocopier can also be a very useful tool, enabling those who have access to one to magnify text as required.

- Magnifiers
  Magnifiers can be held in the hand, worn around the neck, mounted on a stand, or attached to eyeglass frames, special filters, or prism lenses. Some also have a built-in light to increase contrast.

Eleen

Eleen is unable to read print even with her glasses on. Her local low vision centre prescribed a 10X hand held magnifier to help her read. By holding the magnifier very close to her left eye and very close to the paper she is able to read some print,
letter by letter. “It is my only link to the written word,” she says. “Even if it’s a bit awkward, it’s far better than not being able to read at all”.

- **PC with speech synthesis, Braille or enlargement**
  Personal computers (PCs) can display text in large characters and easier-to-read fonts or they can be used in conjunction with speech synthesisers or other devices to convert computerised text to voice or tactile media.

You’ll find out more about this area in the section on ICTs.

- **CCTV**
  Quite a number of visually impaired people use CCTV - closed circuit television - systems to help them to read. A CCTV system consists of a TV monitor and a platform on which reading material is placed. A camera can project the material onto the monitor in a variety of contrasts and type sizes, making it easier to read. CCTV may also be used to assist with writing. There are more than 150 different models now available, including portable CCTVs.

- **Electronic reading machines**
  Optical character readers (OCRs) scan and translate printed text into a text file that can be read by a built-in speech synthesiser or used on a computer.

**Devices for writing**

For visually impaired people who can type, writing may not be such a difficult task. For example, there is a range of word-processing templates to help with writing problems. However, depending on the severity of their vision problems, some people will need more sophisticated technology to help them. For example, a severely
visually impaired person may require a speech synthesiser to ‘read back’ what they have written.

- **Writing on paper**
  Heavily lined stationery, writing frames and guides for envelope addressing can all be used to help with writing on paper. Magnifiers and CCTV systems can also be used to help with writing.

- **Writing (typing) by computer**
  Nowadays, of course, much writing is done using word-processing software on personal computers (PCs). Even without any adaptive devices, the possibility of enlarging text on the screen can be very helpful. Adapted keyboards (e.g. with large characters) can make production easier. And, as mentioned before, screen readers and speech synthesis equipment provide solutions for people with little or no vision.

- **Writing in Braille**
  Traditionally, Braille typewriters (known as ‘Braillers’) have been used to produce Braille documents. Braille printers attached to PCs are a much more convenient solution nowadays.

- **Making audio notes and letters**
  Audiocassettes can fulfil the same role as letters and memo recorders can also provide a very portable and useful solution.

- **Making electronic notes**
  There are a number of personal organisers and note takers specially designed for people with visual impairments. Special facilities may include input via Braille keyboards and output in the form of synthesised speech or Braille. Also, of course, portable PCs provide a way of taking notes or otherwise producing text whilst on the move. They can be equipped with speech or Braille output.
Devices for mobility /walking

Canes and walking sticks, along with guide dogs, are the most well known assistive technologies used by visually impaired people. More high-tech aids have recently begun to be developed such as satellite-based orientation and navigation systems to support blind pedestrians. Developments in this area will be discussed in a little more detail in the section on future technologies.

Adapted everyday items

Telephones
The telephone can be a lifeline for visually impaired people, especially those who live alone. However, using the telephone can be a source of many difficulties because the user can’t read the number of the person they wish to phone or indeed the numerals on the dial. Telephone facilities that are useful for visually impaired people include:
• large numbered buttons
• phones that store numbers
• dialling aids to allow the user to speak the number in order to dial
• answering machines - with an audible signal indicating that there are waiting messages.

Kitchen utensils
For a visually impaired person, activities like cooking, cleaning, eating and drinking may demand novel approaches to the task.

There is a range of adapted kitchen equipment that can be useful to the visually impaired user. Many of these are increasingly to be found more generally in homes, while others have been adapted for use by visually impaired people.

Some items have ‘talking’ adaptations, such as talking microwaves, talking kitchen scales and talking timers. There are also devices, such as milk savers, that make a noise (e.g.
rattling sound) to indicate that a saucepan is about to boil over.

Other items have tactile/contrast interfaces, such as level indicators on liquid measures, ‘easy to see timers’ that have large black numbers on a white background, and tactile kitchen scales. ‘Bumps’ or raised dots can also be used to provide a simple and effective way to mark everyday objects around the house, e.g. the on/off position on a washing machine.

Other useful devices include ‘cutting boxes’ to help produce straight slices and easily gripped knife handles.

**Eating and drinking**
Apart from using a clock-style arrangement of food (so that everything is where it is expected), plate guards can be used to prevent spillage and non-slip mats to prevent plates from sliding on the table.

**Aids for medication**
There are also a variety of devices that help people with visual impairments to take medicines. Such equipment includes daily dose containers, methods for measuring medicines and methods for taking measures of blood glucose and suchlike.

**Games and leisure**
There are a number of games that have been adapted by using tactile or colour contrast or audio interfaces to help the visually impaired user to play. For example, dominoes with raised dots, large print playing cards and bingo sheets, and Braille bingo sheets.

There are also ball games with bells inside the ball - soft for babies, harder for adults.

For leisure pastimes such as sewing and knitting, there are devices to help make needles easy to use, and devices to choose the size of knitting needle, or help count the number of rows.
Research activity - finding out more about these products

A number of producers and retailers operate in the ‘market’ for assistive technology for people with visual impairments. Some of the producers provide information on the World Wide Web; most are listed in the classified telephone directory and if you write or call them, they’ll be happy to mail you leaflets on their products.

Each of these producers and retailers will provide you with information on their products (and why you should buy them!). It is useful to also seek product information from independent organisations, such as local associations for blind and partially blind people or some of the larger organisations internationally. For example, the RNIB (Royal National Institute for Blind People) in the UK produces several factsheets about different types of assistive technology in this area.

Extension activity - where to get these products locally

Even if you know about the assistive technology, it is often not clear where to recommend people to go to buy such products. Use the classified telephone directory or the web to find the most convenient venues near to you to find a range of products?

- Does it look as though a single retailer provides a comprehensive range of products?
- What are the strengths of obtaining products locally?
- What are the weaknesses of obtaining products locally?

Information and Communication Technologies (ICTs)

There is an ever-increasing range of solutions for visually impaired people based on information and communication technologies. These are opening up new opportunities and it is important that people with visual impairments are in a position to benefit from them.

Watching TV

Before moving into the world of computers, the Internet and World Wide Web, it is important to first consider the more familiar pursuit of television viewing. People who enjoy television and who acquire a visual impairment that affects this may experience the loss as a near catastrophe. The screen may look like a blur of brilliant colours without contours or shapes, but with twirling patterns and constant flashes of bright light that can hurt their eyes. They may hear only disembodied voices and cryptic announcements bereft of their visual explanation - no human faces or figures, landscapes, etc.

- TV screen magnifier
  This provides magnification of the TV image. The magnifier needs to be carefully placed at the correct distance from the screen and the viewer, bearing in mind that the viewer should sit directly in front of the television since nothing is visible from an
angle. The screen should be covered after use since the lens can act as a burning glass. Screen magnifiers work for some people but not for others.

- **TV spectacles**
  These are strong optical glasses, specially developed for TV viewing. The user can sit at any angle to the TV set, and they are useful as they can be carried around easily.

- **High-resolution TV set**
  A small TV set with high-resolution screen can allow the user to sit very close and can be a solution for some.

- **TV audio description**
  More recently, there have been developments in the provision of voice description of visual sequences to convey the visual content of TV programmes (and at the cinema). The voice description is transmitted over a second audio channel, which can be received using a decoder box.

  Audio description in Europe is currently limited to a few hours programming in just a few countries, but is becoming more available in the US. However, the Audetel initiative has recently developed an effective way of delivering such a service over the new digital TV systems in Europe.

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  **Research activity - Audetel**
  Find out more about audio description in your own country. Is it available? You can find more about Audetel by searching on the www or by checking
  - http://www.rnib.org.uk/wedo/research/european/infopck.htm

- **Talking teletext**
  Devices are now available to enable the visually impaired user to access teletext services by feeding the teletext display to a speech synthesiser. There are differences across countries as to how this is implemented.
Using computers, the Internet and devices with electronic displays
As the Information Society becomes an everyday reality, we are increasingly using computers, the Internet and equipment with electronic displays in our everyday lives. For people with visual impairments, this presents new opportunities but also poses new challenges. Some of the solutions in this area are outlined below.

• Screen readers and speech synthesis
  As already noted, software that picks up the text being displayed on a computer screen and feeds it to a speech synthesiser is becoming a crucial tool for visually impaired people in the emerging Information Society. These have worked well within the DOS environment for a number of years but it is only recently that they have improved enough to be useful with graphical interfaces such as Microsoft’s Windows environment. Large companies such as Microsoft and IBM, as well as smaller companies, are improving the accessibility of software constantly and this opens up the world of computing, e-mail and information retrieval to people with visual impairments. Further information can be found at http://www.abilitynet.co.uk/

  For screen reading and speech synthesis solutions to succeed, it is necessary that the people producing computer applications and online services design these to suit the requirements of visually impaired users. Although there are well-developed and easy-to-use guidelines available for designers of such software and services, it is unfortunately the case that many services aren’t yet made fully accessible to all. The factsheet on accessible screens provides information on some of the main guidelines in this area.

• Accessible public services
  Computers are not the only new way through which we interact with the world. Increasingly we are confronted with devices using electronic displays, such as bank machines, ticket machines and public information kiosks. These must also be accessible to people with visual impairments. Again, there are now good guidelines on how this can be done (see the factsheet on accessible screens).

Research activity - design for all
With the advent of the Information Society, the supply of information has grown substantially. Unfortunately, not all of this information is made available in an accessible format. There are now well-established guidelines on how to build a web site and make sure that it is accessible for people with visual impairments. You can find information on these guidelines and a tool to check the accessibility of web sites at

• http://www.cast.org/bobby/index.html
Check your five favourite sites for their accessibility. If you or any of your colleagues/friends develop web sites, assess those sites as well.

Online services specially for people with visual impairments
Apart from these services and devices that are targeted at everyone, there are also a number of online services specifically aimed at people with visual impairments.

- Radio reading services
  The first ‘online’ services in this area were the radio-reading services that are still provided in some countries, offered by radio stations that specialise in the broadcast of printed materials. Subscribers to these services have receivers tuned to the station’s frequency.

- Remote reading services
  In some countries, notably Sweden and the US, there are now services for blind people that link them by fax to a remote reading service. When the blind person receives a letter or other printed item they fax a copy to the service and the text is read back to them over the telephone.

- Electronic newspapers
  As noted earlier, for a number of years now, newspapers have been delivered to blind people in electronic form in some countries. These electronic newspapers can be read using speech synthesisers and are laid out with this type of reading in mind. More recently, very many newspapers are now becoming available online on the World Wide Web, opening up new opportunities for blind people all over Europe, provided that they have the equipment needed to access and read the newspapers, and that the newspaper sites are designed with their needs in mind.

- Electronic books
  With the growth of the World Wide Web there has also been an increasing availability of electronic books and other publications. As is the case for newspapers, guidelines are available on how to make these more accessible to blind people who use screen readers and speech synthesisers, and it is important that the providers of these services are encouraged to use them. In Finland, there has also been a recent piloting of online lending of electronic books to blind people.
Research activity - Gutenberg project

A good place to look for electronic books is the Gutenberg project at
• http://www.gutenberg.org/

Have a look at some of the books available on this and other similar sites.

What proportion of them do you think would be suitable for the screen readers and speech synthesisers used by blind people?

The Future

Applications of ICT are opening up many new opportunities for people with visual impairments, especially through the facility that they offer to convert visual text and other material to alternative media such as voice and tactile. As mentioned earlier, the latest technological developments are also opening up new opportunities for services to support blind people to get around in unfamiliar places.

• Orientation and navigation systems
  One solution in the pipeline is the provision of continuous support to blind people as they walk around in familiar or unfamiliar territory.
  Experiments have already been carried out using satellite geographical positioning systems, mobile phones and portable PCs, and the results of these have been quite promising.

• Talking signs
  Public signs that give signals that can be picked up by equipment carried by blind people are also under development and some are already in place in some parts of the world. By carrying a special device that communicates with street or building signs, blind people can be helped to find out where they are and to get to where they wish to go.

Research activity - Nicole

Earlier we told you that Nicole has started to use talking books. Revisit Nicole’s case study and from the information you have just read give advice on what further assistive technology products or services Nicole might consider using.
Research activity - The future for visual assistive technology

Gather information on recent research and development projects in the area of visual impairment and assistive technology. A good place to start is the TIDE and Disabled and Elderly Programmes of the European Commission at:
• [http://www2.echo.lu/telematics/disabl/disabel.html](http://www2.echo.lu/telematics/disabl/disabel.html)

Review activity - Visual impairments & technology

This section on available assistive technology products and services contains a lot of factual information. Think about the more generic messages as well and try to summarise them.

Review activity - Beyond Braille

When people think about tools to facilitate the life of blind people or other visually impaired people, they often think first of all of Braille. However, whilst important, Braille is only used by a minority of blind people. Discuss why and indicate which technologies are often more useful and why.

1.6 Being an assistive technology intermediary (ATI)

This section looks first at the question of whether people with visual impairments are actually acquiring the assistive technologies that they need and at how assistive technology for visual impairments tends to be made available in Europe. A quick reminder of how you, as an ATI, can make a positive contribution in this area is then provided. Later, you’ll look in more detail at the ATI role in particular client settings.

Are visually impaired people getting the assistive technology that they need?

You will have seen from the earlier part of this module that a significant proportion of the population are likely to experience visual problems at some stage in their lives. It is also clear that developments in assistive technology can alleviate many of the difficulties that such problems can cause. But it is disappointing to have to note that many people who could benefit from these assistive technologies aren’t doing so.

This means that many people are suffering unnecessarily and, in some cases, are at risk of serious consequences ranging from social withdrawal and isolation to potentially fatal consequences because of inability to perceive emergency situations.
As is the case for assistive technology oriented towards other impairments, there are a number of factors that contribute to this unsatisfactory situation, including:

- failure to recognise the problem and the potential solutions that are available;
- limitations of the publicly-provided assistive technology service delivery systems;
- reluctance to use useful technologies even when the need is recognised.

As noted earlier, problems associated with vision loss are often slow and insidious in their development. This means that they can go unrecognised for a long time, both by the person with the problem themselves and by their families or the various health and social service professionals that they come into contact with.

Even where unmet needs have been recognised, many people with visual problems still experience difficulties in actually getting their hands on the technologies that they need. In the case of assistive technologies supporting visual impairments, there are a number of particularly problematic features of the service delivery system that can be pointed to.

As is the case for other impairments or functional difficulties, one of the main problems is the tendency for health and social service personnel to give little attention or low priority to visual impairments where the client is an older person.

Another important source of problems arises from fragmentation of services and, in particular, the separation often found between the services provided for optical appliances and those that provide other forms of assistive technology. Usually, once a visual impairment has been identified, there will be some publicly provided service covering optical appliances or, alternatively, clear referral paths to private services in the area. However, the situation is often much less clear for other assistive technologies.

On the one hand, the specialists dealing with optical appliances often do not deal with other assistive technologies, they may not be knowledgeable about the other technologies, or for various reasons they may not make referrals to those who do provide such services. On the other hand, services providing these other technologies are often less well developed and may, themselves, be fragmented into a number of areas.

In some cases clients may know that they have a problem but may be reluctant to seek solutions from assistive technology because of a perceived stigma or other negative connotations.
Assistive technology services for people with visual impairments

Public service delivery systems for assistive technology for visual impairments differ considerably between countries throughout Europe, just as they do for assistive technology in the others areas covered in this courseware. By way of an example, a view of how such services tend to operate in the UK is presented below.

The key point to take from the UK example is the crucial place occupied by the initial pick-up of a potential problem and the making of an appropriate referral. This can be by the person with a visual impairment themselves, by a carer or by a professional. It is this stage of the process, where needs are first picked up and appropriate actions initiated that the ATI role comes into play. If this does not happen then no assistive technology service delivery system will be effective, no matter how well developed and provided-for.

Research activity - How do people get assistive technology for visual impairments in your country?

Below is an example of service provision for the UK. From your experience of services in your own country define which features are similar, which are different and what are their respective strengths and weaknesses?

If you are not sure how these services are organised try and find out.

If you are in the UK think about the gap between theory and reality in terms of how services are organised.

In all cases make notes on your findings.

Things to keep in mind
- What organisations provide equipment: the state, centres providing equipment for disabled people (e.g. disabled living centres), organisations for and of blind and visually impaired people, other charitable organisations?
- What assessment procedures are used to identify the equipment needed?
- Is there any state funding to provide this equipment and what are the requirements of this funding e.g. is it means tested, are the items provided from a limited range of items?
An Example: Assistive technology services for visually impaired people in the UK

Referral route to obtain optical appliances

Referral route to obtain other equipment
The role that health and social service personnel can play as ATIs

The diagram for the UK assistive technology service delivery system presents something of an idealised view, as indeed would similar diagrams for most other countries.

At first glance, for example, it would appear that everyone with a need will be put in touch with the appropriate expertise and either provided with suitable technology or shown how to get it themselves. In practice, the situation isn’t nearly so well developed as this and there are many gaps and unmet needs.

One of the biggest problems is the fact that many people slip through the net and their needs aren’t picked up in the first place. This means that they do not get onto the appropriate referral routes and therefore do not acquire the assistive technologies that could help them.

It is here that all health and social service professionals have a role to play as ATIs. As a reminder, the diagram below shows the types of action appropriate to an ATI that were identified and discussed in the introductory module.

As you will remember, the role of ATI is in many ways quite straightforward - you need to be alert to visual impairments and to unmet needs for assistive technology solutions. Once these are identified, you need to take appropriate action to help your clients acquire what they need.

Which option you should choose depends very much on the situation, your familiarity with visual impairments, the professional boundaries and competencies that apply in your situation, the assistive technology solutions that are available, and the characteristics of the prevailing assistive technology service delivery system in your area.

In addition, whether or not you refer your client/patient to another professional for further treatment and advice, it is critical that you
remain involved to ensure that the problem really is addressed, and that you follow up once assistive technology has been acquired.

Training in how to use assistive technology is one area that is often inadequate. For example, in the case of CCTV equipment 20 hours of training is provided in Sweden but none at all in the UK. If you are familiar with the workings of the main types of equipment you can be of great help to your clients in this area.

Eleen

Eleen paints detailed pictures onto ceramics as a hobby. She has been going to ceramics classes at the local community centre but she is now finding it very tiring to concentrate and her work is not as exact as it was. She is embarrassed and because she is a perfectionist she stops going to classes.

Context activity - What to do about Eleen’s problems

What could someone do to prevent Eleen from stopping? Choose the best option.

- Do nothing, it is Eleen’s decision.
- Support her finding some assistive technology that can help her with her problem.
- Help her to accept her impairment and convince her to go to the family doctor or GP.

Summary activity

Discuss how you can take visual impairments into account in your future or current professional work. How can you detect people with visual impairments, what services can you offer them, what are the most useful sources of information that you can use?

Write down the most important messages from this module so far.
### 2 SPOTTING UNMET NEEDS

#### 2.1 At Home

**Nicole**

Although approaching her 83rd birthday, Nicole Garrett lives alone in her flat. Her children live 100 kilometres away and don’t get to see her more than once a month. She is supported by social services who provide regular home help services. The home help undertakes some of the cleaning and shopping and keeps an eye on her. Mrs. Garrett’s current home help is one she gets on with well. She enjoys her visits and always makes sure the kettle is on so that the home help will sit down for a chat.

On her last few visits the home help noticed the same books had been lying around and that some letters were still unopened. When the home help steered the conversation around to Mrs. Garrett’s books it became clear that she was no longer reading. The home help also noticed that Nicole sometimes asked her what was on TV that night even though the programme guide was on the table.

The various health and social service professionals that work with older people in their homes, such as community nurses, home helps and social workers, have in important feature in common - they see their clients in their home environment, often over extended periods of time, and so are likely to observe any difficulties their clients experience in daily life.

#### Context activity - Your experience of people with visual impairments

Think about someone (perhaps a client with whom you have been involved previously) who developed a visual impairment. Discuss the following issues:
• How was the problem first identified i.e. who signalled the visual problem and how, who validated the visual problem, who referred to whom, etc.?
• What were the weaknesses of this approach, and why?
• What were the strengths of this approach, and why?

Context activity - Home environment and hidden impairments

Anne, a social worker for a home help organisation, received information from the home help about Mrs. Smith and a possible problem that she might have with her vision. What could Anne do about this the next time she visits?

Choose the best option and provide justifications for your choice.

• Advise her to go to the family doctor or GP to get an eye test, glasses and a magnifier.
• Ignore the possibility that she has a visual impairment. Mrs. Smith didn’t get a home help for a problem with her eyes.
• Call her relative and tell her what you suspect.
• Validate the problem by doing some simple tests and talking to Mrs. Smith. If she wants help then you should give her information about vision problems and possible assistive technology and try to persuade her to go her doctor or other services about the problem.
• Go to the family doctor or GP and tell him or her what you suspect about Mrs. Smith.

Spotting unmet needs for assistive technology

The experience of visual problems can vary widely from person to person. Some of the things that clients might report include:

• cloudy vision or blurry vision
• spots in front of their eyes
• being able to see only what is directly in front of them
• seeing only shapes and bright colours
• seeing halos or rings around lights
• migraine headaches
• seeing flashes of light
• not being able to see anything at night
• their eyes hurt
• seeing double
• everything looks distorted.

As noted earlier, a person experiencing visual problems may not complain about it for any of a number of reasons. So, you need to be also aware of changes in behaviour and appearance that could indicate visual impairment. For example, you may notice that someone who is usually well groomed has started to look untidy or to
wear clothes that do not match. Similarly, this person may be taking less care of their home appearance than you have come to expect of them.

Other signs might include:
- unexplained falls
- bruises, cuts, burns
- not recognising you
- inability to find personal belongings
- knocking items over, spilling food etc
- difficulties watching TV, reading or writing even with glasses
- not recognising faces.

Physical signs to watch out for include a protruding eye, a change in eye colour, excessive watering of the eyes, or a sudden crossing of an eye.

An apparent personality change may be another signal for vision problems.

**Mrs. O’Brien**

Mrs. O’Brien had always been a leader at her community centre and an organiser of group events. But gradually her bubbly personality changed. She became withdrawn and refrained even from activities that used to delight her, like playing the piano for the sing-a-long. It turned out that her visual problems, as well as making it difficult for her to see, had started to frustrate and irritate her to the point where she found it difficult to enjoy other people’s company.

**Review activity**

List five items that can signal somebody having a vision problem. Discuss how you would react upon encountering them with one of your clients.

In a later module you will be shown in some detail the various actions that you can take to help clients with such indications to acquire any assistive technology that they may need.

For now, you should remember that there are also many mostly non-technical, practical solutions and adaptations that can make life much easier and better for people with visual impairments. You can play an important role in helping visually impaired people increase the safety of their homes and improve their quality of life by advising them or helping them to adopt the following techniques:
- organising and labelling
- identifying and eliminating hazards
- optimising lighting
- using colour contrast.
These kinds of solution were outlined to you in the Introduction to this module. You’ll find further information in the factsheet on organising the home.

**Mr Williams**

Mr Williams told Anne, his home help, that all he had was burnt baked beans for dinner the evening before. He had intended to have tinned salmon, baked beans and tinned fruit and had opened three cans. Unfortunately, they all contained beans. Having resigned himself to eating beans only, he placed them on the cooker, on what must have been too high a setting, and burned them. Anne suggested that next time he unpacks his shopping she will help him to label the tins, boxes and other items according to a system that suits him e.g. large print, raised bumps or coloured paper. She also suggested that they identify the settings he uses most often on the cooker and the washing machine, and label these as well.

### 2.2 During a Medical Consultation

**Mark**

Mark, a 73-year-old man, has been with the family doctor or GP practice for almost a decade. He has never had significant problems with his health but attends occasionally for minor ailments.

Mark comes into your practice because he has a bad gash on his forehead. He said he got the cut when he bumped into an open cupboard door. When examining him you notice that he has a lot of older cuts, bruises and minor burns.

**Maria**

Maria, a 70-year-old woman, was referred from your practice for cataract treatment some time ago. The treatment was partially successful and the problem is not getting worse. However, Maria now has some permanent visual problems. Neither the specialist nor the hospital seem to have given much attention to the practical consequences of this for Maria’s everyday life. When she next attends you for a consultation you make sure to address these functional consequences of the initial medical problem.
**Context activity - Your experience of people with visual impairments**

Think about a person (perhaps a patient with whom you have been involved) who developed a visual impairment. Discuss the following issues:

- How was the visual impairment first identified i.e. who signalled the visual problem and how, who validated the visual problem, who referred to whom, etc.?
- What were the weaknesses of this approach, and why?
- What were the strengths of this approach and why?

For many people, the practice nurse, family doctor or GP is the only point of contact with the health and social services on a regular basis. This puts these primary care practitioners in perhaps the most powerful position to spot unmet needs for assistive technology amongst the population at large. They are also in the strongest position to help people identified in this way to acquire the assistive technology that they need and/or to get in touch with appropriate specialist services.

A significant number of visual problems present to GPs and family doctors in the first instance. Although they are not expected to treat most ocular problems, they need to be familiar with the normal visual changes that occur with ageing as well as the more common age-related ocular diseases, including glaucoma, cataracts, macular degeneration and diabetic retinopathy.

As is well known nowadays, older patients tend to under-report their general health problems, and to misjudge them as being non-specific or caused by old age. This applies also in the case of visual problems, with research showing that whilst such problems are highly prevalent among older people, unreported or undiagnosed visual impairment is common. For example:

- A German study used a standard questionnaire and visual accuracy test with people over 69 years of age and found that while 72% needed some further ophthalmological diagnostic or therapeutic intervention only 40% of these patients had complained of eye problems. (Fischer et al., 1998)
- A similar study in Wales tested 202 elderly patients attending outpatient clinics for visual acuity, using a standard Snellen chart, and found that patients overestimated the adequacy of their vision. Only 34 patients reported inadequate vision while 72 had significant measured visual impairment. (Long et al., 1991)

Visual impairment has also been found to reduce the older patient’s ability to function independently and to increase their risk of depression and of injury due to falls (Wun et al., 1997). And, an Australian study found that visual impairment (including poor visual
acuity, reduced visual field, impaired contrast sensitivity and the presence of cataract) was strongly associated with two or more falls in older adults (Ivers et al., 1998).

**Spotting unmet needs for assistive technology**

Although there are age-related increases in the incidence of some diseases of the eye, most of the losses in vision associated with age aren’t easily traced to diagnosable medical problems. Visual impairment in older people is often neglected because the loss of sight frequently accompanies more obviously debilitating health problems. For example, susceptibility to discomfort caused by visual glare isn’t a recognised medical problem unless it is secondary to cataracts and two thirds of older persons who are severely visually impaired also have at least one other serious disability or chronic illness.

Sometimes a patient will present to the GP or family doctor specifically with a vision-related problem, most often in relation to the more common conditions, such as glaucoma, diabetes, macular degeneration, cataract or stroke. You’ll find more information about these conditions in the introductory part of the module and in the factsheet on main causes of visual impairments.

Alternatively, the individual may mention eye problems during the course of a general examination, or an examination for some other ailment.

Also, the GP may notice other symptoms that may have a number of underlying causes including the possibility of visual impairment. For example:

- burns, bruises, and cuts may indicate that the person has difficulty performing activities of daily living, such as cooking;
- a normally well-groomed patient may come into the surgery looking dishevelled, or wearing clothes that do not match;
- patients may complain that they have not been participating in social events because of a loss of confidence;
- patients may complain about bumping into furniture, falling over or knocking things over.

It is important to give as much attention to functional difficulties as to medical conditions. Often, medical treatment will control the condition, but the functional problems in everyday life will remain.

Wherever a client has or is suspected of having visual problems always ask about how they are getting on in their everyday activities. (The introduction to this module indicated the various areas that should be addressed in this regard.)
Context activity

Draw up a list of signals that can indicate a person may have vision problems. How often would you expect to encounter them in your practice? How would you act upon encountering them?

Eleen

Eleen has been losing her sight over a period of time. She is now at the stage where she finds that she has difficulty with a lot of daily activities. She is unable to prepare food without difficulty. She also finds that it is difficult to get to the shops on her own and when she gets there she is unable to select the foods she wants because she has difficulty finding them.

Review activity

• What can you do for Eleen?
• From where or whom will you gather information?
• Look in the Introductory module and the factsheets for possible solutions and note the one’s relevant to Eleen.

2.3 In Hospital

Nicole

Nicole has been in hospital for some minor surgery on her hand. Before leaving the hospital as part of the discharge procedure you give her written information on what she needs to do at home in order to care for the surgical wound. You ask her to read it and let you know whether there is any other information she needs. She doesn’t appear to read it and begins to ask questions which are covered in the information.

Maria

Maria, a 70-year-old woman, was admitted for cataract treatment. The treatment was partially successful and the problem should not get worse. However, Maria now has some permanent visual problems. Whilst she is in hospital, the hospital’s occupational therapist makes sure that she has the assistive technology that she needs to make her stay as comfortable as possible. In preparation for discharge, contact is made with the assistive technology services and the community nurse in Maria’s local area and they, along with Maria and her family, are told about the various practical things that can be done to provide support. When she comes back to the out-patient’s department for a check-up, a lot of attention...
is given to how well she is functioning in everyday activities and the occupational therapist checks that she has the right equipment and knows how to use it.

8. Context activity

Using the information in the Introductory module explore strategies to address Nicole’s vision problems.

As noted in the introductory module, older people are more likely than other age groups to spend time in hospital. This makes the hospital setting a crucial one for spotting possible needs for assistive technology and ensuring that those who need it are helped to get it. However, there are various factors that tend to minimise the attention that is given to these types of issue as part of hospital care.

In situations where patients are admitted for and/or treated for conditions that are clearly linked to vision, it is crucial that attention is given to the subsequent functional needs of the patient, as well as to dealing with the immediate medical issues.

Because older patients admitted for problems that aren’t vision related may also be experiencing difficulties with their vision, the hospital stay gives an opportunity to observe the patient carrying out various daily activities and so to pick up signals of possible visual problems and unmet needs for assistive technology.

Healthcare practitioners can deal with these two situations in a number of ways. Where the hospital has its own facilities, such as a vision clinic, and its own occupational therapy and assistive technology resources, then direct referral should be made to these facilities by the practitioner dealing with the overall case. Where the hospital does not have such facilities then it is critical that functional needs and any requirements for assistive technology are addressed both during the hospital stay and in the discharge process.

Pre-discharge planning, the discharge process - especially the discharge letter(s) - and post-discharge follow-up are critical points for the ATI role.

8. Context activity - Discharging people with vision problems

Imagine a hypothetical experience where you are involved in hospital discharge. Make brief notes in relation to the following questions:

- Who would be involved in hospital discharge?
- What information should be given to the patient?
- What information should be given about assistive technology?
- What would be the weaknesses of this approach, and why?
- What would be the strengths of this approach and why?
Spotting unmet needs for assistive technology

As already mentioned, attention needs to be given to patients who are admitted or treated both for vision-related conditions and for other reasons.

In a vision-related case, the patient will obviously be assessed for their visual functioning after admission/treatment. However, whilst attention is usually given to the medical aspects of the condition, the same degree of consideration may not always be given to the practical everyday consequences that can arise from visual problems.

In the case of admission/treatment for conditions that have no obvious link to vision, it is still important that hospital staff watch out for possible vision problems. These may be picked up from what patients say themselves, from observation of their behaviour, and from other more indirect signs.

Observation of difficulties in reading, writing, dressing, recognising people etc. would also suggest the possible presence of visual problems, as would things such as burns/bruises and cuts, poor grooming or apparent poor co-ordination (such as bumping into things, falling over or knocking down items and not being able to eat very well.)

Context activity

Draw up a list of signals that can indicate people having vision problems. How often do you expect to encounter them in your hospital? How would you act upon encountering them.
This module was designed to give you a brief overview of vision impairments and the relevant assistive technology. You can extend this information easily by collecting publications either from an accessible higher education library or a local association for blind or visual impaired people.

Alternatively, you can browse the World Wide Web for further information. Although you can start by searching with words like ‘blind’, ‘visual impairment’ or ‘visual aid’, we suggest you start at one of these sites and follow the links provided there:

- The Canadian National Institute of Blind at [http://www.cnib.ca/](http://www.cnib.ca/)

Other sources of information drawn upon in the text include:

- Bruce et al (1991) *Blind and partially sighted adults in Britain: the RNIB survey* Vol 1 HMSO. [RNIB estimates of the number of visually impaired people in EU based on extrapolated figures and prevalence rates identified]

• Huxley, A. (1943) *The Art of Seeing*. Chatto & Windus


Royal National Institute for the Blind (UK) leaflets:
• Understanding Diabetic Retinopathy
• Understanding Age-related macular degeneration
• Understanding Glaucoma
• Understanding Cataracts
• Blindness the facts
4 GLOSSARY

- **Cataract:** in people with cataracts the normally clear lens of the eye becomes cloudy. Cataracts can vary in size and may cause little trouble in some people, but serious blurring of the field of vision in others.
- **Diabetic retinopathy:** one of the complications of diabetes. In this disease, blood vessels in the retina weaken and haemorrhage causing the person to experience blind spots. Only a small percentage of diabetics are affected by the disease and usually it is people who have had diabetes from early childhood that are affected rather than those who have become diabetic later in life.
- **Glaucoma:** Glaucoma is caused by increased pressure within the eye as a result of various possible defects in the normal drainage system. The disease is usually slow and progressive and causes little discomfort. For this reason, glaucoma is sometimes known as ‘the painless thief of sight.’ There is, however, an acute type that attacks suddenly and is very painful.
- **Hemanopia:** a visual problem that can arise as a result of stroke, where vision is impaired to the left or the right, or to the top or the bottom of the field of vision.
- **Macular degeneration:** the macula is the central area of the retina that is used for sharp focus and is required for tasks such as reading, writing or recognising faces. Degeneration of the macula causes a ‘blind’ spot to develop in the central vision. This spot can range from a slight blur to total loss of central vision. The side vision or peripheral vision remains and can be used to facilitate mobility.
- **RNIB:** Royal national Institute for the Blind
- **WHO:** World Health Organisation
Functional Vision

Functional vision is the ability to use vision in planning and performing different tasks. This requires an assessment of an individual’s use of vision in a variety of tasks and settings, including measures of near and distance vision, visual fields, eye movements, and responses to specific environmental characteristics, such as light and colour. Whenever possible, the assessment of functional vision should take place in the older person’s daily environment. The person’s specific daily goals should guide the assessment to identify the visual skills that will be required to perform them. Assessment in the older person’s environment provides ongoing opportunities to educate the individual and his or her relatives and friends about vision rehabilitation. Functional assessment should include evaluation of the following areas:

The person’s functional visual acuity’s at various distances and under different lighting conditions. The distance at which the person identifies the items should be noted for such common objects as labels on food cans, the TV screen, indoor and outdoor signs, facial details, and printed materials.

The person’s functional visual fields, including the person’s location of everyday objects and perception of information in the upper, lower, and side fields and for near, intermediate, and distance views. This evaluation should be conducted in both static and dynamic modes, in both indoor and outdoor settings, and under different lighting and weather conditions.

The person’s ability to discriminate and identify the colour and contrast of a variety of materials and objects under various lighting conditions. Older adults may have more difficulty with colour and contrast for such tasks as identifying photographs, discriminating dark and pastel colours and visually identifying textures.

The person’s ocular motor skills, including fixation, localization, scanning, tracing, tracking objects, and reading materials. Older adults who acquire low vision later in life must relearn these skills using different body, head, and eye postures.

Lighting, including the type, amount, position, and angle of light sources used while performing tasks. The lighting assessment should evaluate the amount of glare, the time it takes to adapt from indoor to outdoor lighting, and vice versa.
The person’s use of combinations of visual and non-visual cues to detect a variety of objects, landmarks, depth (such as slopes, steps, curbs), glass doorways, differences in terrain and so forth.

The person’s demonstrated use of vision to perform specific tasks that constitute his or her goals. Each goal should be evaluated separately to determine which visual skills are required to accomplish it and whether the person exhibits these skills, both without and with optical and non-optical devices.

Ideally, functional vision assessment is completed by a team of rehabilitation professionals, clinicians, and other professionals like a rehabilitation teacher, an orientation and mobility instructor, or another professional from the field of visual impairment.


### The main causes of visual impairments

**Macular Degeneration**

Macular degeneration is the leading cause of visual impairment amongst older people. The macula is the central area of the retina and is used for sharp focus. It is required for tasks such as reading, writing, or recognising faces.

Degeneration of the macula causes a ‘blind’ spot to develop in the central vision. This spot can range from a slight blur to total loss of central vision. The side vision, or peripheral vision, remains and can be used to facilitate mobility.

Unfortunately, little is known about the direct cause of macular degeneration and there is - as yet - no effective medical treatment. Laser therapy is sometimes useful in the early stages of some types of the disease.

**Glaucoma**

Glaucoma is caused by increasing pressure within the eye as a result of one of a number of possible defects in the normal drainage system. The disease is usually slow and progressive and causes little discomfort. For this reason, glaucoma is sometimes known as ‘the painless thief of sight.’ There is, however, an acute type that attacks suddenly and is very painful.

People with glaucoma experience what is known as ‘tunnel vision’. This means that they can see only objects that are directly in front of them. Glaucoma also affects a person’s vision in dim light, and can result in the condition known as ‘night blindness.’

Fortunately, an eye specialist can detect glaucoma easily. If it is diagnosed early, it may be controlled with medication. Glaucoma patients who use
medication as prescribed may continue to enjoy useful vision for as long as they live.

**Cataracts**

Most people with cataracts are over 50 years of age. Cataracts cause the normally clear lens of the eye to become cloudy. Cataracts can vary in size and may cause little trouble in some people, but serious blurring of the field of vision in others.

In advanced cases, the defective lens is surgically removed and replaced with an artificial lens. Not all cataracts progress to any significant degree, however, and the condition often stabilises and does not require surgery.

**Diabetes and Diabetic Retinopathy**

Diabetics are 20 times more likely to have a vision problem than the average population, and diabetes is the largest cause of blindness in the 60-64 year age group.

Visually impaired people with diabetes suffer from an additional disadvantage. Often, diabetes leads to poor sense of touch, which means that solutions like Braille aren’t available. Also, adult onset of diabetes means that learning new skills like Braille may be very difficult.

Diabetic retinopathy is one of the complications of diabetes. In this ailment, blood vessels in the retina weaken and haemorrhage causing the person to experience blind spots.

Only a small percentage of diabetics are affected by diabetic retinopathy and it is usually people who have had diabetes from early childhood who are affected.

Diabetic retinopathy is unpredictable because the level of vision may change from day to day. The ability to see fades and sharpens irregularly, baffling the individual and their family and friends. Laser therapy can control the degree of vision loss and preserve some useful vision.

**Hemianopia**

This is a condition that may occur as a result of stroke. It can obstruct vision in the right or left side or at the top or bottom of the visual field.

**Vision simulation exercise**

For those working with a visually impaired person, it may be extremely difficult to comprehend the extent of the vision loss. It is easier to conceptualise total blindness than what life is like for the person who is partially sighted. Also, two individuals, possibly even with the same diagnosis and visual acuity, can often see quite differently.

Those who have participated in a VSE describe the benefits as:
- experience of what it is like to be a sighted guide
- increased awareness of barriers in the environment
increased awareness of the importance of developing other senses
increased sensitivity to the needs of blind and visually impaired people
A better understanding of the implications of multiple sensory deficits.

The exercise

The following exercise does not duplicate any particular eye condition. However, it is a powerful introduction to understanding blindness and visual impairment. This sensitisation exercise demonstrates how vision loss can affect one’s perception of the world around one. The senses do not automatically compensate for the visual impairment but other senses can be further developed to provide additional information.

Vision simulators (available from organisations for or of the blind), blindfolds or goggles with lenses that depict different eye conditions are used throughout the simulation exercise.

Divide participants into pairs. One member of each pair becomes the blind or visually impaired person using a blindfold or vision simulator goggles. Note that some people may become dizzy or feel nauseous while wearing a vision simulator.

A typical VSE is composed of four stages

Stage 1: The participant with the vision simulator has time to adjust to his or her new vision and discover how visual impairment can influence behaviour in a conversation.

Apply a blindfold or vision simulator to the participant while seated. Have the visually impaired participant commence a brief conversation with the sighted partner.

Stage 2: Allows the visually impaired participant to adapt to remaining vision (if there is vision) and experiment with the use of remaining senses.

This enables the person to build confidence, adaptability and coping strategies prior to participation in more active complicated tasks. Have the visually impaired participant identify common household items in a bag or identify food items on a tray placed in front of him or her. Have the visually impaired participant describe an item to the group that he or she successfully identified from the bag or tray.

Another option may be to have the participant complete a specific task such as drink a glass of water or spread peanut butter on a slice of bread.

Stage 3: Active participation in exploring the environment continues to heighten awareness of the person wearing vision simulators.

Using the sighted guide technique, take the participant for a walk. Have the visually impaired participant notice changes in sounds, air currents, wall and floor textures and odours.

Have the visually impaired participant use the bathroom facility.

Stage 4 (most important): Discussion of the group’s experiences.

Many will express the same concerns that blind and visually impaired older people have had. The leader should help the participants explore the range
of feelings they experienced, such as apprehension, fear of falling, a lack of trust, embarrassment or disorientation. Most participants are astounded by the experience and what they have learned.

Each partner should have the opportunity to experience the vision simulation tasks.

### Organising the home

Applying some of the measures outlined here can help provide a safe and secure environment for visually impaired people and, by doing so, help to increase their independence. In some European countries there are funds available to help cover the cost of adaptations and improvements.

#### Finance for house adaptations, United Kingdom

A person who is registered or is eligible to be registered as a disabled person (this includes blind and visually impaired people) can apply for a disabled facilities grant from their local council. These grants are available for work needed to provide access in and out of the person’s home, necessary kitchen and bathroom adaptations and adaptations to heating and lighting controls. The amount allocated is dependent on the local council’s budget and also on the applicant’s income. [Making your home fit you - RNIB leaflet]

However, you need to be aware that some of the possible solutions aren’t always suitable or attractive to the visually impaired person. For example, re-organising the home may be very confusing for an older person and sitting closer to the TV may not always be an acceptable solution.

#### Outdoors

A number of things can be done to ensure that the environment immediately outside a visually impaired person’s house is safe and secure. For example, levelling and improving pathways, increasing the lighting around the front door, levelling steps, installing an intercom system and fitting hand rails where necessary.

#### Indoors

Four principles - can be used in rooms throughout the house to help create a safe and well-organised home for the visually impaired person:

- lighting
- colour contrast
- eliminate hazards
- organise and label

**Improve natural and electric lighting**

Brightness, location, and type of light are all important factors to consider when choosing a lighting solution for a person with a visual impairment.

Good lighting is the most basic requirement for reading, writing and other close work, and in some cases an individual’s visual problems can be alleviated simply by adjusting the lighting. Activities that involve close work, such as finding a number in the telephone directory or reading...
instructions in the back of a rice packet, will all benefit from a good source of light.

Put lamps in places where the person does close work e.g. kitchen counters, reading-writing area. Use increased lighting in all areas and especially in those areas where accidents are more likely to happen e.g. stairways and doorways.

However, lighting that is comfortable for one person may not be comfortable for another. For some visually impaired people, looking into illuminated areas, such as a patch of sunlight on the floor, or coming from the dark into a well-lit room, may be uncomfortable or even painful.

*Improve the colour contrast*
Introducing contrast, for example by placing dark-coloured objects on light backgrounds and vice versa, can often help visually impaired people to see them.

Using contrasting colours between carpets and walls, furniture and wall colours, doors and door handles can help visually impaired people identify their location and move around more easily. For example, place dark furniture on light carpets and vice versa. When replacing floor coverings and furniture, go for plain colours, as patterned coverings can be confusing.

For reading, a sheet of coloured acetate can be used to increase the contrast between typeface and background and help the visually impaired person to read the text. However, this may be problematic in cases of colour-blindness, so that conventional black letters on white background may be preferable.

*Eliminate hazards*
For the visually impaired person, there are many hazards in the home. Simple things like leaving doors open or shoes in a walkway can cause an accident.

The simplest technique is to ensure that walkways are always kept clear of objects, that furniture is placed out of the way and is returned to its usual position should it be moved for any reason. Make sure that there is no worn carpet and that mats are stuck down.

The slippery surfaces found in bathrooms present many dangers to people with vision loss. Adjustments such as using non-slip mats when bathing or showering can help to make the bathroom a safer place.

Steps and stairs can be a nightmare for someone who can’t see well. Going up isn’t so bad as there is a slight shadow that indicates the edge of each step. Going down there is no shadow and the edge of the step tends to blend with whatever is beneath.

Simple solutions such as a yellow or white stripe painted on the flat edge of each step can help the person going down to tell where the step ends.

*Organise and label*
Providing everything with a place and returning everything to its place immediately after use will ensure that everyday items are easy to find when
they are needed. Simple techniques such as keeping things that are used together close to each other - on the same shelf, in the same closet, or in the same box - will also make them easier to locate.

Labelling can be used to identify things in the kitchen, for example spices, tins, and the settings on the cooker and washing machine. There are many labelling techniques - large print labels, raised markings (e.g. bumps or stickers with Braille type), magnetic strips that record a voice message that can be re-read later, different colour stickers etc. The standard tactile warning for hazardous substances (‘Tactile Warning EN272’) should also be used where necessary.

accessible Screens, Web pages and Public Access Terminals

A number of style guides have been provided giving the basic usability qualities that facilitate screen reading by all end-users. But they do not necessarily ensure that accessibility and usability by people with disabilities is maximised. For that purpose, a number of Accessibility Guidelines have been developed by the INCLUDE project, addressing the needs of people with disabilities.

One major problem is that the transfer from character-based to graphical user interfaces imposes a serious barrier to visually impaired people, since most assistive devices – e.g. screen access systems which translate screen text to speech output or Braille - are character oriented. New products for accessing graphics exist on the market and other are being developed, but a study under-taken in Sweden shows that the current systems are still of insufficient quality for Internet applications.

INCLUDE examples of good accessibility practice:

- Provide text alternatives to graphics, by use of ALT-TEXT, text anchor or an alternate text-only page.
- Text-only pages must be updated in parallel to the main graphics pages. A fully accessible text is of no use, if the information content is obsolete.
- For movies, make a description of the sound and words of the movie. Use captions, text tracks, an alternate text file or an alternate sound track.
- Image maps allow a user to click on different parts of a picture to reference different WWW pages. This feature requires the ability to see, is completely inaccessible to blind persons. They don’t know what the picture is, and don’t know where to click, even if the picture is described. Thus, provide text anchors for all links accessible through an image map or, preferably, provide an alternate text-only page.
- Users should be able to switch back and forth easily between text-only and graphic versions of the page.
- Forms are usually inaccessible. Provide a form that can be downloaded then mailed or E-mailed, or a phone number where the requested information can be provided.
- Minimize the use of tables. Tables cause problems for screen access systems, since the screen reading software tend to read line by line, character by character, from left to right. In a multicolumn document,
the screen reader has no logical construct to follow, which makes it very difficult for the user.

- Use standard HTML formats, tags etc. Assistive devices must assume that standard features are used.
- The PDF (Portable Document Format) is increasingly popular on the WWW because of its appealing visual appearance. PDF is largely inaccessible to visually impaired people, because a PDF source document provides no internal element descriptors that can be easily accessed and subsequently translated for a blind user. However, the vendor, Adobe Inc., is attempting to make PDF more accessible. Adobe has developed a special ‘plug-in’ that presents an alternative view of an open document in a separate window. This view contains the texts in as close to reading order as possible.
- Avoid non-standard data structures and viewers. The only way for custom data and views to be accessible is if the access is built directly into the viewer. Standard access tools do not generally work with special viewers.
- Use colours and background patterns that contrast well with the text. Use colours that will make the pages easy to read by people with colour blindness.
- Minimize the number of multiple hypertext links that appear in a single line of text.

See also the very comprehensive guidelines available on the Web Accessibility Initiative website at www.w3.org/TR/WAI-WEBCONTENT

Public Access terminals

For the public to benefit from public access terminals, people must be able to interact with the wide range of public terminals that are now being designed. The Royal National Institute for the Blind publication - ‘Access Prohibited?’ - provides information for the designers of public access terminals. The publication explains the range of disabilities that make access difficult and provides guidelines on how terminals can be designed to be as accessible as possible to all potential users.

A checklist of some of these design guidelines are as follows:

Locating and accessing a terminal
- Location signs easy to read?
- Adequate lighting?
- Queuing arrangements?
- Audible location system for blind users?

Card systems
- Cards contain user requirements?
- Contactless card system?
- Embossing on cards?
- Card notch for orientation?

External features, labels and instructions
- Labels positioned to be easy to read?
- Braille instructions?
- Legible labels?
- Numbered instructions?
- Funnelled card entry slot?

Screens and interactions
- Screen shielded from sunlight?
- Minimised parallax problems?
- Other languages?

Operating instructions
- Concise and simple sentences?
- Audio jack sockets?
- Audible feedback of key input?
- Speech output?
- Video links?

Keypads
- Telephone layout for numeric keys
- Raised dot on number 5?
- Raised or recessed keys?
- Internally illuminated keys?
- Tactile feedback on keys?
- Generous time allowed for key input?

Touchscreens
- Option to increase character size?
- Large key fields?
- Text accompanies graphical symbols?
- Speech output option?

Retrieving cards and receipts
- Cards protrude at least 2 cm?
- Documents protrude at least 3 cm?