



Enabling the
information society

Accessible Technology

A guide for IT professionals

Acknowledgements

Edited by John Lamb of *Ability* magazine

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Foreword

IT today pervades all aspects of our lives. The prospect of excluding a significant proportion of the more than 10 million disabled people in the UK from services that everyone else takes for granted is deeply shocking and yet that is the current situation.

Without access to IT, disabled people are often unable to live as full lives as they might. Activities such as working, shopping, communicating with friends and finding out about the world become difficult or impossible. Commercial companies that ignore disabled people are likely to miss out on a share of the £80bn per year that they spend.

Despite a growing body of law requiring organisations to enable disabled people to access their web sites, enterprise systems and mobile devices, disabled people are still too often overlooked. However, we can and must change that.

As BCS members and IT professionals you can make a big difference, not only by following best practice in your own work, but by encouraging all decision makers in your organisation to take account of people who cannot use standard IT facilities without some form of adjustment or assistive technology,

BCS, The Chartered Institute for IT, has been involved with activities to support disabled IT users, and those who work with them, since the late 1960s when most computer data appeared on paper and help for vision impaired people was confined to outputting Braille characters on adapted line printers. In 1975 BCS formed a specialist group on disability to promote the development of accessible technology and to influence public policy on issues affecting the use of IT by disabled people.

One member of the group, Ken Stoner, founded IT Can Help, a network of IT professionals who still today provide free help to disabled users. By 1992, BCS had established the Computability Centre, in collaboration with IBM and Birmingham University, as a help and advice centre for employers and employees.

That groundbreaking work paved the way for the launch of AbilityNet, the national charity that helps disabled adults and children use computers and the internet by adapting and adjusting their technology.

Currently, BCS is a member of One Voice Coalition for Accessible ICT, which is a group of like-minded organisations involved with IT and disability. The coalition's current focus is developing a case for businesses to engage with disability and exclusion when considering their IT investments.

Awareness and understanding of the issues are the keys to ensuring that everyone can access IT. The steps involved are not complicated, nor is achieving accessibility expensive. What is required is that accessibility is considered whenever IT is under discussion.

Our vision is that everyone, whatever their capability, should be able to sit in front of any screen and be confident that they can access all available information and services. Reading this guide is your first step towards helping us achieve that goal.

Elizabeth Sparrow, BCS President

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1. Executive Overview

Over 10 million people in the UK have some form of physical or sensory disability, and that number is rising steadily with the country's ageing demographic profile. In 2008, for the first time ever, the majority of people in the UK were over 50 years old, the age at which disability begins to increase rapidly.

This fact, combined with the continuing explosive growth of new technologies - digital TV, radio, internet and mobile technology - means that no organisation dealing with the UK public should ignore the issues surrounding access by people with disabilities to mainstream technologies.

These digital channels will only grow in importance. Indeed, the government's Digital Britain programme promises a massive investment in infrastructure that will create huge opportunities for organisations to reach more people, faster and at less cost.

Since 1995 organisations have been required by the Disability Discrimination Act (DDA) to make reasonable adjustments to their websites and IT systems to allow customers and employees to access them. In the public sector the Disability Equality Duty, introduced in 2006, goes further; requiring authorities to draw up policies relating to all aspects of disabled access.

However, the evidence is that despite tougher laws many disabled people are still excluded from taking part in our increasingly digital economy, with disastrous results. Disabled people represent a market worth some £80bn per year, according to estimates by the Institute of Employment Studies. With disabled adults of working age only half as likely to be in work as non-disabled people, their exclusion is also a waste of skills.

The degree of assistance that people need in using IT varies enormously, but solutions need not be complicated or too costly. There are many ways in which IT professionals can help disabled employees and customers to access enterprise systems.

Sometimes access will involve providing special purpose software or hardware, but in the majority of cases it will be a matter of adjusting off-the-peg systems so that they are more comfortable to use. Often professional help will be required to set up systems, but in many cases users will be able to make changes themselves through built-in accessibility features.

Users who have difficulties seeing or whose body movements are limited probably need most assistance. Talking computers that use screen reader software and programs that magnify text or allow users to adjust the appearance of information are invaluable to people with sight problems or who suffer from dyslexia.

Those with physical difficulties may require other ways of entering data and controlling a system than via a conventional keyboard or a mouse. A variety of alternative devices are available to plug into desktop systems including trackballs, switches and adapted keyboards.

The important thing is to consider disabled users when systems are commissioned so that accessibility is built into the fabric of enterprise computing rather than bolted on as an afterthought. IT professionals do not have to make decisions about exactly what adaptive equipment to buy as there are specialist assessors who can be hired to advise on what is most suitable for each individual.

There is a strong case for arguing that employees should be able to make adjustments to their systems without having to involve IT specialists. Disabled people are reluctant to put themselves in a special category because many believe that their disability stems from the fact that the products they use have not been designed for them.

This is known as the social model of disability and it holds that society itself has 'disabled' people by constructing long flights of steps, or installing lifts without Braille on the buttons and so on. In contrast, the medical model of disability puts the emphasis on correcting a disability so that a disabled person fits into his or her environment.

Many disabled people quoted in the case studies in the appendix at the back of this guide say that accessible IT not only allows them to work but opens the door to more rewarding jobs. Employees who are not disabled also stand to gain from an IT strategy that acknowledges the differences between people and makes alternatives to standard systems available.

The purpose of this guide is to enable IT professionals to develop an integrated approach to disability and to provide practical guidance on the best way to go about it. In the following pages the guide looks at the available technology, sources of advice and the issues involved in drawing up effective accessibility policies.

John Lamb

2. Who needs accessible IT?

Whether it is typing accurately, remembering the steps involved in operating a mobile phone or filling in a complex form online, most people have difficulty using IT from time to time. However, for a significant proportion of people with a disability the barriers to accessing IT are so great that they need extra help.

Disability takes many forms and covers a wide range of impairments. Some people have sensory disabilities covering difficulties with sight, hearing and speech. Others are physically disabled and have problems with mobility.

A large group suffers from cognitive impairments that include dyslexia and learning difficulties. And there are those who struggle with the debilitating effects of diseases, such as depression, arthritis and multiple sclerosis. Some individuals are affected by several syndromes at once.

In most offices there is another increasingly vocal group of people who experience discomfort using IT – those who suffer from repetitive strain injury (RSI) as a result of using a mouse, excessive keyboarding or sitting at a workstation incorrectly. These people can account for a large proportion of those who have trouble working with IT.

Accessible IT — IT that is accessible to all users — is not just a ‘nice to have’ element in the business plan, nor merely an aspect of a company’s social responsibility programme; it is increasingly a legal component of best business practice.

Under the Discrimination Disability Act (DDA) employers are obliged to make reasonable adjustments to their goods, services and premises to cater for disabled people. The DDA provides disabled people with rights and places duties on employers. So, for example, an employer is under a duty to make a reasonable adjustment where working practices or any physical feature of their premises places a disabled person at a substantial disadvantage compared with people who are not disabled.

More importantly, it helps encourage employers and employees to work together to break away from rigid employment practices, identify what adjustments and support might be needed, and find flexible ways of working that may benefit the workforce as a whole.

Additional legislation has strengthened the DDA. The Disability Equality Duty requires public sector bodies to make special efforts to cater for disabled employees and citizens who use their services. Discrimination against people on the grounds of age has also been recently outlawed and special regulations apply to the needs of disabled schoolchildren.

Organisations that fail to make their IT systems accessible are just as much breaking the law as the department store or bus service that doesn’t offer wheelchair access. In fact, guidelines specified by the DDA make it clear that the law applies to IT just as strongly as it does to buildings and transport systems.

Although a major case involving accessibility has yet to come to court in the UK, the threat of legal action has resulted in out-of-court settlements for some disabled IT users, often as a result of intervention by charities that represent

disabled people. Abroad, organisations as diverse as AOL, Adobe and The Olympic Committee have had to respond to pressure to improve the accessibility of their products and services.

“Half the people I speak to suffer pain, discomfort or have a disability associated with the use of a computer. These days we have a less resilient working population leading more sedentary lives in which inefficiency is the need to leave your desk. In that situation, if a worker’s activities become stressful, they are affected much, much quicker. We have to get away from the old-fashioned idea of disability for just a few people. Half of all employees may have an interest in improving the way they use their IT.”

Bill Fine, AbilityNet

3. Making the business case

Catering for disabled people is not just a matter of legal imperatives, nor of corporate ethics. Providing accessible IT makes sound commercial sense from an employer's viewpoint, offering broad-ranging benefits.

Organisations that are accessible to disabled staff and customers will be more accessible to everyone. Increasingly global markets and changing demographic trends mean companies need to engage with 'diversity' to reach out to minority groups. By embracing diversity, organisations can open up new markets, access previously untapped reserves of talent, reduce staff turnover, and enhance their image both with employees and outside stakeholders.

Many of these ideas will be outlined in a forthcoming publication from The One Voice Coalition for Accessible ICT, a consortium of groups with an interest in IT and disability. In a report on the business benefits of accessible IT leading private and public sector organisations reveal how embedding the ideas of diversity and inclusion as core values in their IT strategy can benefit customers, employees, the business and society as a whole.

3.1 Employing disabled people

Disabled people are not only as productive and reliable as any other staff, says the Employers' Forum on Disability in a booklet called *Unlocking Potential: The New Disability Business Case*, they are also likely to have better attendance records, stay longer and have fewer accidents. They have skills in solving everyday living problems that can be useful at work and can also help identify, develop and deliver products and services for the growing market of disabled people.

Staff morale is higher in companies that are seen as good employers – and customers and shareholders also appreciate concern for this issue, particularly customers who might be relatives, friends or carers of disabled people. Employers with staff who are disabled report reduced medical retirement and work-related injury costs, and reduced stress and sickness. Surveys consistently conclude that organisations having successfully employed disabled people are keen to employ more.

In the future, the proportion of older people in the population is set to grow and along with it the age of the workforce, especially as people may need to work beyond the traditional retirement age. People over 60 are the most likely to suffer disability and, collectively, older disabled people make up a group that is likely to grow ever larger as the population ages. For example, already half of Japan's 127 million population is over 50, and many other developed countries are mirroring this trend.

3.2 Marketplace benefits

A higher proportion of disabled people need to shop for goods and services online because they are unable to visit shops, so companies that use a website to trade will not be able to serve disabled customers if their site is not accessible. The Institute of Employment Studies estimates that disabled people spend £80bn per year in the UK alone, so an organisation that fails to cater for such a large market may lose out on substantial revenues.

This is especially true if one considers that the number of older people (who are most likely to have trouble using IT) is growing rapidly. In the UK, there are 15 million people over 55, making up a quarter of the population and this group is increasing by 180,000 a year. The over 50s own three quarters of all financial assets and account for half of all discretionary spending power in developed countries, according to the *Economist* magazine.

Dutch bank Rabobank reckons that its investment in user friendly automated teller machines, online accessibility and Braille facilities gave the company £225,000 in free publicity in one year as well as attracting business from hospitals and other organisations involved with disabled people. The company spent eight years developing more accessible services as it closed physical branches and moved to doing business electronically. UK companies such as Legal and General, Tesco and Virgin have also reported returns on their accessibility investments in terms of additional sales and customer satisfaction. Tesco claims its improved website added £13m in sales in one year, Legal and General says sales of some products tripled, while Virgin saw revenues grow by more than 60 per cent.

The advantages do not end there. Commercial websites that have been re-launched in a more accessible form have benefited from savings in maintenance of up to 70 per cent, rises in search engine traffic of around 30 per cent and big increases in the number of visitors just as a result of improved compatibility, according to IT charity AbilityNet. Software company Microsoft maintains that more than 60 per cent of its users access one or more Windows features that was originally designed for disabled people because the facilities make them more productive.

In the public sector, where accessibility is taken more seriously, accessing services and information via the internet is a critical communications tool. More and more citizens are demanding self-service facilities that allow them to use the web to pay taxes, claim benefits and look up information. Public bodies now have a duty to include disabled people in online services.

However, the market message has been slow in getting through to many website owners. The evidence so far is that a large number of websites fail basic accessibility standards such as the World Wide Web Consortium (W3C)'s *Web Content Accessibility Guidelines*. Between 80 per cent and 96 per cent of websites may fail this simple yardstick of accessibility, according to AbilityNet. The organisation reported that in 2008 there had been no discernable movement towards accessibility since a Disability Rights Commission investigation four years earlier put the proportion of inaccessible sites at 81 per cent.

3.3 Social responsibility

Corporate social responsibility (CSR) means conducting business ethically and in such a way that increases human development, benefits society and is good for the environment. IT accessibility is an integral part of CSR in demonstrating an organisation's commitment to providing equal opportunities to its employees, stockholders, suppliers and customers.

3.4 Legal requirements

The rights of disabled people to be treated equally are enshrined in national and international laws. In many countries new laws relating to accessibility are being introduced and existing ones strengthened. In the UK, organisations are required by the DDA to make reasonable adjustments to the way they supply services

so that they include disabled people. Those reasonable adjustments cover websites, as well as the hardware and software used by both employees and customers to access IT systems.

Further regulation is in the pipeline. The UK has recently signed the UN Convention on the Rights of Persons with Disabilities. The Convention calls on governments to ensure information intended for the general public is provided in accessible formats and technologies appropriate to different kinds of disabilities in a timely manner and without additional cost. Additional legislation may be needed to meet the Convention.

The European Commission estimates that no more than 5 per cent of government websites in Europe are accessible and set a very ambitious target of 100 per cent accessibility by 2010 at a conference held in Riga three years ago. More recently the Commission has proposed legislation to ensure that all EU nations adopt accessibility rules designed to ease disabled people's access to the web.

Information Society and Media Commissioner Viviane Reding has talked of a European Disability Act that could compel EU nations to adopt web accessibility rules, so that all of Europe's websites become accessible at the same rate. Meanwhile, the Commission is also pondering rules that would ensure public procurement of accessible IT. This approach mirrors Section 508 of the Americans with Disabilities Act, which requires federal agencies to buy accessible technology.

3.5 What will it cost?

There is no getting away from the fact that accessibility will impose additional costs on organisations. These will include the extra resources required to develop accessible systems in house, additional testing to ensure that websites and enterprise systems meet accessibility criteria, as well as the burden of documentation and training in new systems. It may well be that organisations that specify that IT should be usable by disabled people will have to pay more for software and services that carry an accessible tag.

One of the problems that any large organisation faces is what to do about its legacy software and content. An accessible approach may demand that thousands of web pages are reformatted or that important enterprise systems are replaced. Few want to bite this bullet.

Without sufficient planning, the costs associated with accessibility efforts during development can exceed the costs of doing business-as-usual. However, with advanced planning and good practices, the cost of accessibility can be kept to reasonable levels. Accessibility is cheaper and more effective when it is addressed from the outset, rather than tagged on later.

Fortunately a growing number of off-the-shelf software and hardware products now contain adjustments and other accessibility features as standard. Some leading suppliers have set up development groups to be responsible for ensuring that as many accessibility features as possible are incorporated in new products.

In addition, international organisations have hammered out standards to help developers adapt mainstream IT for disabled people. Most standards setting has centred on the internet because of the importance of web browsing in everyday

life. Organisations such as the World Wide Web Consortium have devoted a lot of effort in this area, not only developing standards but also tests that allow web designers to see whether their pages meet the required benchmarks.

The commonest disabilities in the UK

40% learning, cognitive and development difficulties
28% physical disabilities
18% hearing impairments
14% vision impairments

Source: HumanITy

4. Barriers to change

4.1 Lack of awareness

Persuading organisations to adopt accessible IT has proved an uphill struggle. Many organisations have been slow to catch up with changing technology and new legislation relating to disabled people with the result that they still fail to include accessibility in their criteria for acquiring new IT. As a result, internal systems remain inaccessible, which prevents disabled staff from working efficiently or even excludes people from employment altogether.

The picture is much the same for disabled users of external systems such as websites. For example, scores of surveys around the world have looked at website accessibility and most conclude that the majority of sites fail to come up to even the most basic standards. Even well intentioned organisations have struggled with awareness. In the UK, the Central Office of Information has attempted to ensure accessibility among departmental websites by threatening to withdraw their right to use the .gov.uk domain. The tactic has so far failed to have the required results.

One deadline for all government sites to comply with the W3C's *Web Accessibility Guidelines*' AA standard had to be extended. Now websites owned by central government departments must be conformant by December 2009. Websites run by central government executive agencies and non-departmental public bodies must fall in line by March 2011.

4.2 Low profile of disabled people

Those working with technology often have little contact with disabled people. Even in very large organisations there may only be no more than a few hundred disabled employees known to the human resources department. In addition, many people, including those with seemingly obvious impairments, do not necessarily regard themselves as disabled and would not dream of asking for special treatment.

Research by the Department for Work and Pensions shows that 52 per cent of those who would meet the legal definition of disability prefer not to describe themselves in that way. Independent living is the object of many disabled people. Any strategy for deploying accessible IT should not necessarily count on disabled users to identify themselves or to be proactive in the process of deploying accessible systems.

Disability is often difficult to define. It can be broadly categorised into five areas – vision, hearing, learning, mobility and communication – but the reality is that individuals are not put in a box that easily. Many people have more than one impairment and, of course, a particular piece of technology may be suitable for people with different impairments.

4.3 Legacy systems

The difficulty of changing legacy systems was cited as the biggest barrier to accessibility by those who took part in a 2009 *Survey Into Attitudes to Accessible IT* research conducted by Bloor Research. Among public sector organisations 55 per cent named problems with upgrading existing systems as their most pressing concern. In the private sector 29 per cent of respondents put legacy systems as their top problem.

The vast majority of systems were acquired before accessibility became an issue. Many cannot be upgraded and organisations are reluctant to replace them before they are fully depreciated. Systems that can be upgraded also present difficulties because they may not work with other legacy systems, requiring complex integration exercises before they can do so.

4.4 Budget constraints

Money is a particular stumbling block at a time of economic restraint. The Bloor Research survey concludes that a lack of perceived revenue and productivity benefits are at the root of problems with budgets. In other words, if the returns can be quantified, then the investment is forthcoming. Some organisations create reasonable adjustments budgets that are related to the legal requirement to provide accessible IT and are separate from their overall IT budgets.

4.5 Lack of training

Accessibility features hardly at all in the training of developers, engineers or IT managers, making it very difficult to implement accessibility strategies. End users also need to be trained in how to adjust their systems and how to use sophisticated software such as screen readers and speech-to-text programs. Training is regarded as expensive and disruptive, although many IT professionals report that simple demonstrations are often enough for them to understand the difficulties that disabled people face.

4.6 Changing technology

The dynamic nature of IT is a challenge for those seeking to comply with accessibility standards. Audits, automated tests, manual inspections and user testing to check for compliance may help ensure that systems are initially accessible, but subsequent changes can quickly render them non-compliant unless care is taken to set up processes to ensure they are kept up-to-date. In addition, there is a confusing variety of assistive technology and a large number of products on the market.

5. Implementing Accessible IT

For some time organisations have known about a sizeable army of people who have difficulty or discomfort using off-the-peg software and hardware and have been trying to do something about it. However, accessibility is not a challenge that can be met overnight. It is not an issue widely understood, despite disability discrimination laws. Initiatives to help disabled people need to be robust, but also flexible enough to respond to their individual needs. It is not a matter of one size fits all, but of making IT systems usable by as many people as possible.

Accessibility is a long-term issue that affects all IT decision making. IT professionals need to plan ahead because by failing to specify accessibility in today's systems, they risk excluding a significant proportion of people for years to come. Too often, accessibility is seen as a complicated business that affects only a few people.

In the hurly burly of business life, pressures of time and money mean that it is easy to let good intentions slip. However, employers are coming under increasing legal, political and social pressure to do more to cater for the growing number of disabled people seeking work and to make sure that everyone can access their products and services.

5.1 Leading from the top

So what can IT professionals do to ensure that their organisation's IT is accessible? One thing is certain that success in this area, as in so many others, depends on a clear lead from the top. The commitment of senior management sends a signal about the importance of accessibility and will spur others to learn more about the subject and make accessibility part of their thinking about IT. Everyone is in favour of accessibility in principal, but what is not so obvious is what priority they should give it.

An important first step is to make sure that the IT department knows as much about the subject as possible. The major charities have published a great deal about technology issues, and these offer a valuable source of guidance. There are also consultancies with specialist knowledge of accessibility. There is a list of useful sources of advice and information at the back of this guide.

5.2 Adopting best practice

There is an increasing body of knowledge about the best way to approach accessibility, which may involve some or all of the following:

- drawing up an accessibility policy;
- devising an accessibility checklist that enables IT service people and developers to identify important access issues when delivering services and designing new products and services;
- appointing someone to act as an accessibility champion;
- ensuring that people with disabilities know about and have access to appropriate assessments;
- involving disabled people in all design activities, starting at the concept stage and going on through all phases of development;
- having a procurement policy that specifies accessibility as a requirement in all hardware, software, networking and systems an organisation buys;

- hiring disabled people - developers will understand the issues much better through personal experience;
- working with colleagues to communicate the policy to staff.

5.3 Accessibility policies

An accessibility policy should make it clear to everyone involved in IT that they are obliged to make technology accessible to people with disabilities and explain in outline how to go about it. The policy should start with a general statement of an organisation's overall diversity and legal policies and then go on to describe in more detail the steps that staff should follow to ensure that systems are as accessible as possible. There are a number of technology management issues that may need to be considered, including:

Security

The personal approach to accessibility sometimes conflicts with wider IT policies. For example, desktop lock-downs introduced with the aim of improving security, reducing the amount of support that is required and simplifying systems, are quite common. But these can have important adverse effects on accessibility. Users may not be able to run assistive software stored on flash memory sticks or store user preferences locally.

Lock-down policies can also prevent users making adjustments to their mainstream software, either by removing features that improve accessibility or making their use too restrictive. For example, limiting the size of fonts that can be used on a desktop system may prevent someone who needs a large size font from reading documents.

A company policy of insisting on a technical support person being on hand to plug a device into a USB port will be very expensive to run if it involves site visits to out-of-the way locations to install assistive technology. Systems should be designed to allow helpdesk staff to place systems in administrator mode and override local restrictions.

Custom-built systems

Custom-built systems make special demands of IT departments in ensuring accessibility. An IT department has to make adjustments to the bespoke modules that support software such as screen readers, magnification and speech-recognition. The widespread use of web interfaces as front ends for enterprise systems is good news for accessibility, since web interfaces are usually more accessible than custom-built screens.

The Department for Work and Pensions has invested a lot of effort in devising procedures to ensure that a small IT group can keep pace with changes to some of the biggest custom-built systems in Europe, delivering services to tens of thousands of desks. The department has set up an Accessibility Solutions Team, which includes representatives from suppliers and is responsible for developing scripts for systems, liaising with software developers, testing systems and producing guidance for disabled users. The team ensures that when changes are made to custom-built systems they are available to disabled users at the same time as everyone else.

Cloud and thin client technologies

Cloud and thin client technologies that enable users to access applications and data via web browsers can create problems for assistive software by making

it difficult to run programs locally. Thin client technologies make it hard for assistive programs to intercept screen displays. Most assistive software requires a hard disk and a minimum amount of processing power for screen reading, magnification and speech recognition programs. Special versions of some accessible technology, mostly for people with vision impairments, have been developed specifically for thin client servers.

5.4 Standards

Considerable effort has gone into developing standards to guide developers and technology managers. The best known is the W3C's *Web Content Accessibility Guidelines (WCAG) 2.0*. WCAG 2.0 describes how to make web content accessible to people with disabilities. WCAG 2.0, which was introduced in 2008, applies to more advanced technologies, is easier to use and understand, and is easier to test automatically than WCAG 1.0. It is part of a series of accessibility guidelines, including the *Authoring Tool Accessibility Guidelines (ATAG)* and the *User Agent Accessibility Guidelines (UAAG)*.

In the UK, the British Standards Institution (BSI), in collaboration with the Disability Rights Commission, has published the *Publicly Available Specification (PAS) 78: Guide to good practice in commissioning accessible websites*. It provides guidance to organisations on how to go about commissioning an accessible website from a design agency. It describes what is expected from websites to comply with the *UK Disability Discrimination Act 1995 (DDA)*, making websites accessible to and usable by disabled people.

The European Union is also developing a standard for the public procurement of accessible IT called *Mandate 376*, which will cover hardware, software and websites. The EU's aim is to draw up a list of accessibility requirements that will be described in a user-friendly manner and be available online. In addition, working parties in Europe are considering accessibility standards covering virtually every aspect of IT including natural languages, contactless cards, voice response, tactile systems, document management and ergonomics.

5.5 Check lists

Accessibility should be on the checklist of anyone with authority to sign off work in an IT department. The checklist need not be exhaustive, but there are a number of things it should cover including directions to:

- use hardware and software products that promote disability access, especially systems introduced after the policy comes into effect;
- design and implement work environments that accommodate all users;
- observe web page design standards that improve accessibility for all;
- make systems as compatible as possible because that increases accessibility;
- always try to separate the presentation layer from the content layer when developing any kind of IT system;
- use emerging technologies that improve accessibility.

5.6 Disability champions

One way of encouraging people who may need help with IT to come forward is to appoint a champion in the IT department that is someone to keep disability issues on the boil. The Employers Forum on Disability, which represents 400 UK companies with a particular interest in disability, has brought together a group of chief information officers who are leading their organisations' efforts to make IT accessible. The biggest challenge, according to Steve Lamey, Director General

of Her Majesty's Revenue and Customs (HMRC) and joint chair of the Business Technology Accessibility Taskforce, is 'to win the hearts and minds of the our 17,000 managers, some of whom would prefer not to hire someone who is disabled'.

5.7 Assessments

Assessments are a critical part of finding out what adaptations might improve a disabled user's way of working. They are carried out by consultants in the workplace, or remotely using broadband links that allow assessors to observe users and control their systems. In the workplace, assessments are used to determine what help can be made for reasonable adjustments under the Access to Work grant scheme. In education, assessments play a crucial part in the funding process involved in the Disabled Students Allowance.

5.8 Procurement

It is vital to let suppliers know that an organisation is committed to buying accessible technology and ensuring that accessibility is always included in any contracts that are signed. IT suppliers are not covered by the DDA in that they have no obligation to make the products they sell accessible. It is the responsibility of their customers to ensure that they comply with the law, so for this reason it is important for IT departments to satisfy themselves that they are in line with current legislation.

It is important to find out what products meet accessibility standards and, if the product is not accessible, to see if there are ways to make it more accessible. IT professionals may need to work with the manufacturer of the product to encourage them to build in accessibility features. They should ask questions about keyboard access, displays, sounds, timing and documentation. These questions should be used in the IT department's product review process when making a purchasing decision.

5.9 Hiring and training disabled people

There is no better way of keeping an IT department up-to-speed on accessible IT than staffing it with disabled people. People with disabilities not only make loyal, hard-working employees, but they can help with advice on developing accessible systems. Employers with staff who are disabled report reduced medical retirement and work-related injury costs, and reduced stress and sickness.

Training is always a low priority in IT, but in the context of accessibility it is vital for both disabled users and IT professionals responsible for delivering accessible systems. It is important to bear in mind that mastering an eye-gaze system or a screen reader adds another layer of complexity for disabled end users, so they will need extra training time. In-house staff also need instruction in how to deliver accessible systems.

5.10 Working with colleagues

There is a key role for IT professionals to act as ambassadors with colleagues in other functions such as marketing, sales, operations and HR to inform them of the need for and the benefits of making IT-enabled business processes accessible to all. This may be particularly the case where, for example, the marketing department wants a particular design or colour layout on a company website. Similarly HR departments need to ensure that line managers understand what their staff should be entitled to as regards assessments and an adaptive working environment.

5.11 Managing costs

One of the commonly voiced complaints about accessible IT is that it imposes an extra layer of cost on already overstretched IT budgets. However, the costs involved are not as great as may be thought, and many practical solutions are free or low cost. The majority of adaptations to IT systems cost nothing, and further solutions are available for under £100.

More expensive items, such as Braille terminals, are required only in a small number of cases. There are, for example, no more than 8000 people who read Braille in the UK. Similarly, for every vision-impaired person who needs a screen reader there are 200 who just need bigger or clearer characters on screen so that they can read them.

In many cases, employers may be able to offset some costs via assistance from government agencies. The Department for Work and Pensions (DWP) runs a programme called Access to Work that is designed to help disabled people find employment. Access to Work pays grants to employers to help disabled people get a job or to keep a job if they are already working.

5.12 Accessibility Maturity Model

Company executives can now consult a scorecard that will tell them how good a job they are doing at ensuring their IT is accessible to disabled people. The Model has been devised by the Business Taskforce on Accessible Technology (BTAT), an Employers' Forum on Disability initiative. BTAT members are a group of senior IT executives from household name organisations concerned with setting new standards for accessible ICT in business and procurement.

The idea behind the Model is to help organisations from board level downwards to identify the different aspects of accessibility that they need to consider and to work out how far they have got on each one. Crucially the tool positions accessibility as a business driver that impacts on the whole business and including marketing and HR teams as well as IT functions.

The Model includes a scorecard consisting of eight headings covering business drivers, standards, governance, resources, delivery, procurement, legacy systems and the reasonable adjustments process. Under each heading there are five levels from informal to optimised which indicate an organisation's level of maturity with levels 1-2 placing an organisation under potential legal risk.

The benefits of using the model are slicker processes with fewer exceptions, increased staff productivity, an improved user experience and more accessible IT on the market, according to Sean Smith one of the architects of the scorecard. EFD will piloting the AMM with its members from January 2010, with a public launch planned for March.

"You can't rely on people to do things on a best endeavours basis. It is important to put in place a governance framework to ensure compliance with accessibility standards and have a process for managing non-compliance"

Graeme Whippy, Lloyds Banking Group

6. Building an accessible website

It is vital that people with disabilities can understand, navigate and interact with the web, because it provides access to information and services that was previously impossible. However, most websites and web software have accessibility barriers that make it difficult for people with disabilities to use the internet effectively.

Over the years a large number of surveys of web accessibility have been carried out. The disability and IT charity AbilityNet ran a series of investigations, called eNation, that looked at the accessibility of organisations in different sectors and scored them on a five-point system. Very few of the sites the organisation inspected, including those run by banks, supermarkets, holiday companies and football clubs, gained even three out of five stars. These results are typical of every survey of web accessibility.

One study by web accessibility consultancy Nomensa found that 90 per cent of top company sites fell short of basic levels of accessibility. A recent report by the European Commission revealed that only just over 5 per cent of public sector websites are accessible. The EC puts the blame for slow progress towards accessibility on a lack of training, which means that site developers and people who provide content are simply unaware of the need to make sites accessible or how to do it.

The most common failing of web designers and people posting fresh content on sites is to omit alternative text for images, or to provide inappropriate text, with the result that screen readers designed to read websites aloud for blind and dyslexic users or people with learning difficulties do not work properly. The Royal National Institute for the Blind estimates that 2 million disabled people in the UK, out of an estimated 7 million, are unable to use the internet because of accessibility issues.

A second major shortcoming is a failure to properly title frames on websites, which again confuses screen readers. Web developers should avoid using frames altogether. Other flaws identified by tests included poor scripting, forgetting to indicate when a human language changes on websites and incorrect presentation of tables. Often websites are developed by designers who understand the need to make them accessible, but whose work is undone by those responsible for running a site day-to-day.

6.1 Standards

The effort involved in making a website accessible depends on the content it contains, the size and complexity of the site and the development tools and environment that surround it. Many accessibility features are easily implemented if they are planned from the beginning of website development or redesign.

Putting inaccessible websites to rights calls for a lot of work, especially sites that were not originally coded properly with standard XHTML markup, and sites with certain types of content, such as multimedia, or sites that will be accessed from mobile devices such as smartphones. The main powerhouse behind web accessibility is the W3C's *Web Accessibility Initiative* (WAI), which has drawn up internationally agreed guidelines for accessibility and resources to help developers build accessible websites.

The WAI's *Web Content Accessibility Guidelines (WCAG) 2.0* explain how to make web content accessible to people with disabilities. Web content generally refers to the information in a web page or web application, including text, images, forms, sounds, and so on. WCAG 2.0 reflects a change in the way web accessibility should be achieved. There is a shift from ensuring that a user can access everything to an emphasis on usability and the need to help users get to content while hiding content from assistive technology when it is not directly benefiting the end user; for example, hiding decorative images from screen-reader users.

According to the W3C, it is essential that several different components of web development and interaction work together. These components include:

- content - the information in a web page or web application, including natural information such as text, images, and sounds, as well as code or markup that defines structure and presentation;
- web browsers, media players, and other devices;
- assistive technology such as screen readers, alternative keyboards, switches and scanning software;
- users' knowledge, experiences and strategies for using the web;
- developers and users who contribute content;
- authoring tools - software that creates websites;
- web accessibility evaluation tools including HTML validators and Cascading Style Sheets (CSS) validators.

User experience consultancy User Vision surveyed 208 disabled users throughout the UK recently and asked them to rank in order of preference their most important issues when browsing websites. The results were surprising in that they did not focus on access issues, but instead on more general usability issues:

- clear content, straightforward language and a clear, simple layout;
- good navigation and the ability to know where you are within a site;
- meaningful and clear hyperlinks.

'Accessible websites can look fabulous, be interactive and use up-to-date multimedia capabilities, such as images, sound, movies, Javascript, photographs and server-side technologies like PHP or ASP,' says Jim Byrne of the Guild of Accessible Web Designers. 'You can use all the "stuff" you deem appropriate to your audience and message, have a site that is accessible and passes accessibility checks. Admittedly it is not all easy, for example, captioning of multimedia is a specialist and difficult task.'

In the new guidelines, information structure also becomes more central to accessibility. WCAG 2.0 separates presentation and layout from functionality and structure. In this way, if a user cannot access the presentation of information – for example because they are blind or because style sheets are not supported on their browser – it will still be easy for them to understand the way content is grouped and to access the information provided.

Publicly Available Specification (PAS) 78, a 56-page guide, produced by the British Standards Institution, explains how those who own websites should go about ensuring that disabled people can use them.

PAS 78 covers:

- commissioning, developing, publishing and maintaining a website;
- how to contract web design companies and accessibility auditing services;
- defining an accessibility policy for the website;
- the Web Accessibility Initiative (WAI) guidelines – what they mean and which ones to follow;
- how to check that a site conforms to best practice;
- useful provisions in addition to WAI guidance.

6.2 Dealing with technologies

Everyone involved in accessible website design emphasises that the process of building an accessible site results in a website working better: it will load faster, be easier to navigate and will look just as good as the existing version. Many companies now put accessibility in their contracts with developers, with the possibility that in a few years' time hardly any websites will be built that have not made an effort to be accessible.

The first step in ensuring a website can be used by disabled people is to ensure that it can be used with as many different browsing technologies as possible – not everyone is using the latest version of Internet Explorer. Consultancy Webcredible has identified the browsing technologies, each with their own accessibility requirements that a site is likely to have to deal with. They include:

- text-only Lynx browser;
- webTV;
- screen readers;
- handheld devices;
- screen magnifiers;
- slow connections (below 56kb);
- very wide - 1600 pixel - screens.

Each form field should have its own label. It also helps to group fields together and to ensure that users can navigate a form without using a mouse. Accessify.com, the accessible tools website, provides a step-by-step wizard that runs developers through the creation of a form or table, and then provides them with code to cut and paste into an HTML document.

The majority of inaccessible text is provided in portable document format (PDF), early versions of which are incompatible with screen reading or text magnification programs. Acrobat, the program developed by Adobe Systems that turns documents into PDFs, can be set up to work with assistive software. The program is able to detect screen readers and allows users to reflow large type so that text does not get lost at either side of a PDF file when it is magnified.

Authors of PDF documents can indicate in which order a screen reader should read elements, such as headings, in a document, allowing vision-impaired users to make sense of complicated pages. Navigation aids make it possible for users to scan through the contents of documents before going to a particular page, while images can be labelled with tags that are picked up by screen readers.

6.3 Commissioning an accessible website

With in-house accessibility design skills still in short supply, most organisations will commission a specialist web design company. But how do those doing the commissioning know whether a supplier is up to the task? The best way to gauge the credentials of a prospective developer is to ask whether they are aware of the latest techniques for providing accessibility and insist that every page they produce is in the latest version of XHTML.

‘These days you are hard pushed not to bump into an accessible website designer — it’s a way of differentiating yourself from the competition,’ says Jim Byrne, founder of the 400-strong Guild of Accessible Website Designers (GAWD). ‘Manufacturers too are taking it seriously because the market is changing. If you try to sell to a council or college something that is not accessible they won’t buy it because they would be breaking the law.’

6.4 Accessibility audits

An accessibility audit can take from one day to three weeks depending on the complexity of a site. It not only involves checking web pages, but also the procedures for updating them and tools such as content management systems. The processes involved in creating content are important in making a site as clear as possible. The RNID spent the majority of its budget for a new website on laying down style guidelines for creating content and improving the writing skills of staff.

Although there are many automated testing tools available, a manual inspection is critical, because only a person can tell whether a webmaster has properly implemented key accessibility features such as using alt tags to describe images and links. An alt tag that doesn’t make sense is next to useless.

Armed with the results of the audit, website managers can decide whether to build a new site or retrofit their existing one. Which way they go will depend on whether the code needs changing or whether the site needs more radical surgery. With websites undergoing rewrites every two or three years, the chances are that a rebuild for accessibility can be incorporated into an organisation’s normal schedule of updates.

6.5 Testing for accessibility

Testing is essential for ensuring that a site is accessible. Free automated tools, such as Cynthia Says and paid for automated testing services from companies such as SSB Bart Group, Site Morse, Hi-Software and IBM are available. Pages are submitted to testing sites that produce reports that highlight any shortcomings in their design, often in a rather difficult to understand fashion.

Automated accessibility tools are useful because they can save a lot of time. Unfortunately, though, many of the key aspects of accessibility can only be checked by a person, because they are subjective or very difficult to evaluate in an automated test. Accessibility testing is a booming area, but few organisations use testers with a real disability to try out their websites. AbilityNet, The Shaw Trust and the Usability Exchange provide testing services that use disabled users.

6.6 Emerging technologies

The technologies used to create accessible websites are developing rapidly and are likely to become the norm for all website design. One of the big shifts is away from the standard HTML language to a version called XHTML, which aids the

production of accessible websites because it ensures that pages appear in the same way on all browsers. At present, browsers try to correct mistakes in pages masking errors from developers and, as a result, produce unintended effects when pages are viewed in different browsers.

Many users are now considering open source software. Open source web content management systems separate content from presentation and make it easier to add new material, and they are now competing with mainstream products costing up to £10,000. Cascading style sheets (CSS) that separate content from presentation help to format a site. Websites use style sheets to download information about fonts, layouts and so on directly to each user's browser, allowing the user to change the look of a page. However, it is also advisable to determine that a site can be used without style sheets — in a text only format — which involves ensuring that menu bars and content fall into the correct order once page formatting is removed.

Shopping carts are often the least accessible aspect of ecommerce. The Newcastle Company Division has introduced software featuring an online content management system. Users can add products and pages, set up site promotions and receive invoices direct to their mobile phones. The software, called Tradingeye, is compatible with screen readers that translate visual images for blind and partially sighted users. It can also be adapted to a large text format.

Google has introduced an accessible search that gives priority to pages that are most easily used by vision-impaired people. Accessible search examines the HTML markup found on a web page. It takes account of the simplicity of the page, how much visual imagery it carries, how well it renders with images turned off and whether or not it can cope with keyboard navigation. There is also an accessible version of Twitter to enable disabled people to participate in social networking.

6.7 Simpler interfaces

Seven million people in the UK have literacy problems, according to the Cabinet Office, which means that they have difficulty reading, even though their eyesight is adequate. Speech-enabling a website has a two-fold benefit to people with literacy problems. Firstly, it makes the site accessible to them. Secondly, users are able to access information that was previously only published on paper and therefore unavailable to them.

Browsealoud is one company that provides technology to speech-enable a website. Site owners purchase a licence that allows any user of the site to download the Browsealoud browser plug-in. Using the plug-in the user points at a piece of text that they want read to them and the software converts the text into spoken English. Not all the information on a website is in HTML, so Browsealoud also supports the other major text formats including PDF, accessible Flash and accessible Java.

The Department for Education and Skills (DfES) has developed Myguide, a simple internet interface for those who don't go online. Myguide is being run by University for Industry (Ufi), a training organisation that has some 6000 online centres around the UK. There are about 16 million people who have need of Myguide, says the DfES. They include people with physical or cognitive disabilities and those who do not yet see the benefit of the internet. Myguide is intended to be a companion that gives people guidance on how to use the internet. The software has an uncluttered interface that people can personalise

and a simple email facility. The developer claims it is possible for someone who has never used email software before to send and receive messages on Myguide within 20 minutes.

6.8 Nine steps to an accessible website

Learn about web accessibility

The best place to start learning about accessibility is the Directgov website, which has copies of the Disability Discrimination Act and the associated Code of Practice. The W3C's site (www.w3c.org/wai) has a great deal of material about WCAG 2.0. It is also important to involve disabled people as soon as possible in market research. What do they want from a site and what unnecessary problems do its pages give them?

Measure a site's accessibility

To speak with authority, it is vital to have a view of the accessibility of a site. Consider getting a licence for the JAWS screenreader, Dragon Naturally Speaking speech-to-text program or other commercially available assistive software. This will also make it easier for an organisation to hire disabled people. Some automated testing may be useful at this early stage to identify the most obvious accessibility issues, but automated testing should only be used as part of a more extensive usability strategy.

Develop a policy

Everyone involved with web development needs to know why accessibility is important. IT professionals should develop a clear policy on accessibility for the website. For example, what level of WAI conformance developers should aim for, how they will involve disabled people in the briefing and testing of a redeveloped site and what sort of processes are in place to ensure that content, especially material in PDF format, is accessible.

Find suppliers

This is the heart of the matter: finding suppliers with the right skills. People are working to develop accreditation schemes for companies that deliver accessible websites. But the best way to identify developers with the skills is to look at their track record. Have they delivered websites that organisations such as RNIB or AbilityNet have confirmed are accessible?

The most inexpensive way to introduce accessible IT is to design accessibility into systems from the outset. As more people become aware of web accessibility issues and begin to follow best practice, building an accessible website should not cost any more than a non-accessible one. In addition, by including those customers or visitors who would not be able to access a site otherwise, companies can generate additional revenue through increased sales of products and services.

Draw up a contract

State in the brief that the website must deliver to WAI guidelines. Aim for the higher level AA level, not level A. Having an AA level may help future proof of your site's conformance. Once you've got a supplier, inspire them. Sit them down with disabled people, so that they get what's needed direct from the coalface. Developers are creative and imaginative people who will respond to this approach. Make sure that the contract specifies that the site as delivered must achieve your chosen level of WAI compliance. Make sure that the contract says that the site must be accessible on delivery. If not, it must be repaired at their expense.

Ask for a prototype

You cannot tell if a site is accessible by looking at it. You need to test it in practice and to do that you need a prototype that demonstrates the quality of encoding. Make sure the brief and contract make this a must. It will save everyone time and money if the prototype highlights problems at an early stage rather than after the whole site is encoded.

Do-it-yourself

Test the prototype quickly and simply for basic accessibility. Do information and transactions get delivered through the speaking browser? Can you easily change text size or move around the site without using a mouse? Does it work with scripts turned off? This is not a substitute for expert evaluation and user testing, but it will catch gross inaccessibility and give you an early warning.

Check with real users

Gather feedback from users with varying levels of web experience, using a variety of screen access technologies and accessing the site from a range of computers, operating systems and browsers. Moreover, make sure that any usability testing is task-oriented: for example, if you are operating an online store, you may want to set the testers specific goals such as buying a random list of goods.

Record how long it takes to complete the tasks, what steps they take to locate specific items or information, how easy or difficult they rate the tasks, and any other problems they experience. Web designers can use services like those run by the Shaw Trust and AbilityNet to access pools of users for site testing. Involve disabled people at the beginning and at the end of development.

Go beyond automated testing by making sure that the *Web Content Accessibility Guidelines* are applied appropriately. For example make sure:

- exclusive use of colour to differentiate information is avoided;
- page titles, form field labels and alt tags provide meaningful information;
- linked text makes sense out of context (avoid 'click here' links);
- content is appropriately marked up with list and heading tags;
- tables are only used for presenting tabulated information;
- cascading style sheets are used to style and format content.

Maintain it

Good designers complain that they deliver accessible websites, but the site then drifts away. Never put key information as a graphic only. Make sure that formats like PDFs are done in a way that makes them accessible. Whenever a site undergoes any major structural or design changes make sure you revisit your accessibility strategy and update your usability testing periodically.

7. The role of suppliers

Mainstream suppliers are now taking more interest in making their systems accessible. Dell, IBM, Microsoft, Oracle and Hewlett-Packard have all made efforts to do more for disabled people. Even Adobe, whose Acrobat software was once threatened with a boycott by the US Congress, hired its most fierce critic to advise on how it could make the program interface with software used by blind people and other disabled users.

However, suppliers could do more on accessibility, according to readers of *Ability* magazine. In a survey nearly a third of respondents said mainstream suppliers were doing poorly in catering for disabled people. Among the criticisms were poor interfaces between special assistive solutions and off-the-shelf software.

7.1 The Accessibility Interoperability Alliance

The Accessibility Interoperability Alliance, a group of suppliers who collaborate on standards and specifications for assistive applications, acknowledges that 'compatibility and interoperability challenges are currently the major issues preventing widespread adoption of assistive technology'.

Early in the evolution of graphical user interfaces, a set of application programming interfaces called Microsoft Active Accessibility (MSAA) was released to support the creation of assistive tools and accessible applications. Since MSAA's advent, many additional web and desktop user interfaces have evolved, and diverging specifications have also been developed to support the accessibility of these new technologies, such as UI Automation, Linux ATK, Java accessibility API, WAI-ARIA Roadmap and IAccessible2. However, at present, no single set of specifications comprehensively supports all the new technologies, and the specifications themselves are not completely compatible.

Efforts are being made to address the problem. In Windows 7, for example, Microsoft has attempted to integrate its legacy Microsoft Active Accessibility (MSAA) application interface more closely with User Interface (UI) automation software designed for developing accessible technology and for making mainstream software compatible with assistive technology products. In Windows 7 it does not matter which interface an application used originally. The company has also improved its on screen keyboard and magnifier.

7.2 Design-for-all

Campaigners have argued for some time that the only sensible way of achieving IT accessibility is to ensure that technology is designed from the outset to be used by everyone. This approach is called design-for-all. The main advantage of building in accessibility from the start is that companies avoid having to make costly reworks to include accessibility at a later date, as happens all too often.

A design-for-all strategy also has the benefit of making systems generally more usable. However, lack of funding, disagreements about what is required to make a product accessible, and a low level of awareness of the need for accessible design have hampered progress.

7.3 Assistive technology suppliers

In addition to mainstream companies the UK boasts a thriving assistive technology industry composed of small companies producing and distributing specialised software and hardware. The industry, which has a combined turnover of around £70m per year, exports around 15 per cent of its output and

in several fields, such as software for vision impaired users, is ahead of the rest of the world. Leading assistive technology companies recently set up the British Assistive Technology Association (BATA) to:

- lobby for the rights of those who need assistive technology;
- provide expert support to government departments;
- educate people on the benefits of assistive technology;
- promote British assistive technology products.

8. Case studies

8.1 HMRC makes IT less taxing

Her Majesty's Customs and Revenue (HMRC) is one of the biggest IT users in the UK. The organisation is determined that all its 85,000 employees, 12,000 of whom are disabled, are able to access its internal IT systems. HMRC's strict accessibility standards require that all new website content, products and applications meet the requirements of the Disability Discrimination Act and adhere to internationally accepted standards.

The department has 450 users of Dragon NaturallySpeaking dictation software and 40 users of the JAWS screen reader program. The software is backed by teams of trainers and by user support networks. In addition HMRC has delivered 200 other accessible systems and amassed the biggest collection of ergonomic mice and keyboards with over 1,000 different items available.

HMRC has appointed a disability network coordinator to represent disabled employees and their views to senior management. Led by Director General Steve Lamey, a former Chief Information Officer, the department is also raising awareness of IT accessibility and its importance within the system development community.

In one example of the impact of HMRC's policies, the career of John Flanner, a blind civil servant, was transformed when speech recognition software allowed him to access HMRC systems and to take on more responsible work. He had spent 20 years as a typist.

8.2 Mandy De La Mare keeps in touch with voice systems

Blind user Mandy De La Mare, who has no upper limbs, uses a novel system that allows her to run a screen reader and speech recognition on the same computer. Developed by the Thalidomide Trust, the system toggles between the two programs using a foot-controlled switch and foot-operated keyboard.

Efforts by the Trust and its technology suppliers to run voice input and output on the same computer system failed because the programs interfered with one another and created microphone feedback. De La Mare uses a HAL screen reader, Dragon NaturallySpeaking speech-recognition software and an integration program developed by GHG Software. She relies on the screen reader to play back content on screen and speech-recognition to command the system and write. She also uses her feet to operate a keyboard for writing emails, composing documents and surfing the internet.

8.3 Tesco rings the changes

A 20-minute demonstration by the RNIB that revealed the inaccessibility of Tesco's grocery website was enough to convince the company that it needed to act. Blind people could not easily navigate Tesco's site.

In a decade-long programme first the company ran separate accessible pages, because it would have had to increase its servers tenfold to support a single site. Then the supermarket firm launched a redesigned, integrated site using a different 'skin' to present its accessible version. Tesco estimates that the new site contributes an extra £1.60m per year from online sales to disabled people compared with the £35,000 it cost to redevelop.

8.4 Leonard Cheshire retrains Andy Stanbridge

As a career for disabled people IT looks a good bet: the work is not physical and assistive technology means that most people are able to use a computer. However, it is still tough to get a start in the field. Andy Stanbridge is one of the lucky few. He has turned what began as a pastime into a paying job that involves supporting disabled users and running a team of four volunteers at a centre operated by the Leonard Cheshire charity in Derbyshire.

Stanbridge worked for the Coal Board at Calverton in Nottingham for 12 years. However, cancer caused problems with his shoulder and he also had diabetes, which meant that he could not continue with such physically demanding work. Then at the age of 38, he went to the Portland College for disabled people and did a one-year IT course. Leonard Cheshire's Workability scheme provided kit and mentoring and Stanbridge sat a City & Guilds Level II qualification in ICT systems and support. Almost immediately he found a job.

He was taken on as an IT facilitator at a Discover IT suite based in the Genesis Social Enterprise Centre, a converted bus depot in Alfreton, Derbyshire. The facility is one of seven centres designed to give disabled people access to IT that are run by Leonard Cheshire with help from Microsoft.

8.5 Legal & General profits from accessibility

At insurance company Legal & General, David Rhys Wilton also stresses the financial benefits of accessible web design. A project to update the site has saved £200,000 per year on maintenance, resulted in a 95 per cent increase in visitors getting a quote for life insurance and boosted life insurance sales by 90 per cent, he says.

Other benefits Legal & General gained from its revamp were an increase by 30 per cent in traffic generated by search engines and a three-fold improvement in the time it took to load a page.

8.6 UBS gets analyst back to work

Jemma worked as a support analyst at UBS Global Asset Management in the City of London. Compiling large amounts of data involved a lot of keyboard and mouse use. Over a period of three months she developed pains in her arms that affected both her work and home life.

After a face to face assessment it seemed that the pain and swelling was most likely to be due to work related upper limb disorder, or repetitive strain injury. The first step UBS took was to try and lighten Jemma's load by installing voice recognition software and reducing her keyboard use to four hours spread over the working day. In addition, she began to dictate information to a second person who entered data via a keyboard. Jemma began regular physiotherapy sessions and shiatsu massage.

The skilled nature of Jemma's work made it difficult to work with a helper. As it became clear that she was continuing to struggle, despite the support and adjustments, the occupational health department recommended a six month period off work. She continued with her treatments and had several assessments while she was at home. After four months Jemma began a gradual return to work over a period of eight weeks. Working time started at four hours for three days and increased back to normal in stages.

8.7 Chevron tackles repetitive strain injury

Oil company Chevron says it has more than halved lost working days and compensation claims from employees due to repetitive strain injury (RSI). The incidence of RSI in the company had grown by 67 per cent in five years despite efforts to reduce injuries among office workers. Over 40 per cent of all injuries in the company were due to RSI.

The company used an online assessment tool to assess the risk of RSI among 30,000 employees. Special laptop accessories such as full size keyboards, use of so-called stretch software with built in breaks and online ergonomics training helped reduce the number of workplace injuries.

Chevron also invested in ergonomically designed office equipment such as Gold Touch keyboards, which can be adjusted to reduce the strain on a user's wrists. The company developed a so-called repetitive strain injury prevention (RSIP) plan that called for employees to provide data about their work habits and environments so the company could calculate their risk of RSI.

Initially, 30 per cent of employees were categorised as at high risk of RSI. Safety managers used RSIP data to channel help to employees most at risk. Injury prevention software sent automated messages about health and safety to those most likely to get RSI. Chevron saved a lot of money in reduced compensation claims. 'In one business unit, the average cost per claim went down from \$83,000 to \$36,000,' said the company.

8.8 Stephen Duckworth on the move

Stephen Duckworth once stopped his car to ask a policewoman whether he could do a U turn. 'Yes,' she said, 'but who is driving?' The 46-year-old entrepreneur was sitting in the passenger's position next to the steering wheel and empty driver's seat.

Duckworth is one of 13 people charged with overseeing preparations for the London Olympics in 2012. As a board member of the Olympic Delivery Authority and a businessman with a busy schedule, Duckworth needs to be mobile. He travels a lot for his company Disability Matters, which advises business and government about disability issues. His Mercedes Vito van is designed to be controlled by someone with just slight movement in his right arm and two fingers of his right hand. Everything from the radio controlled door lock to the voice operated horn has been adapted.

The steering wheel, brakes and accelerator are operated by servo motors controlled from an electronic joystick that is sensitive enough to pick up Duckworth's limited hand movements. He moves the stick by means of a clamp moulded to the shape of his right hand. Left and right movements turn the wheel. Moving the stick forward or back operates the accelerator or brakes.

Diagonal movements allow him to turn the van and speed up or slow down at the same time. Controls that are needed while the vehicle is moving along such as indicators, headlights and horn are activated by nine voice commands. Duckworth switches the voice system on and off by pressing a toggle button under his chin. Auxiliary controls for the radio, interior light and so on are activated by a small keypad.

8.9 Disabled employees included in Defra's refresh programme

Disabled employees at the Department for Environment, Food and Rural Affairs (Defra) were a top priority during a major refresh programme called the Renew IT Desktop Programme. The project involved rolling out Microsoft's Vista operating system and introducing new Lenovo X61 laptops to the majority of employees.

The upgrade of technology such as operating systems can be especially problematic for workers who have required modifications to their set-ups, as problems can leave them unable to work. Defra hired AbilityNet to carry out individual reviews to identify the adjustments that were needed in each case and to provide support for deployment and training.

AbilityNet worked with Defra, using a combination of telephone screening, personal consultation and analysis of training needs to assess how the upgrade would affect staff. It was often possible to establish through the consultation whether or not a user's existing set-up would operate effectively following the Vista upgrade.

9. Assistive technology

There are a great many different types of assistive technology and a large number of products on the market, many of them available free, in addition to individual pieces of hardware and software. Disability can be broadly categorised into five areas – vision, hearing, learning, mobility and communication – but the reality is that individuals are not so easy to put in a box. Many people have more than one impairment and, of course, a particular piece of technology may be suitable for people with different impairments.

9.1 Vision

Screen readers

Screen-reading programs give a vision impaired person access to a computer by incorporating a speech synthesiser that reads out text displayed on-screen. Screen readers can speak out everything on a screen or individual elements such as letters and punctuation. They can also read back tags, menus, dialog boxes, tool tips and system messages. Users can vary the speed and volume at which text is read out.

Some systems have different voices to distinguish between typing and screen information, mouse information and messages. Screen readers are available as part of the Microsoft Windows and Apple OSX operating systems, although these lack some of the advanced features of stand-alone readers. Market leaders are Hal, JAWS and Window-Eyes. Software companies providing screen readers, magnification and Braille software have begun porting their products to USB sticks. The sticks give users the freedom to install their software and settings on any computer they use. There are a number of free and open source screen readers including NVDA and Thunder.

Magnification programs

Windows has several screen enhancement features that can be altered to improve visibility for partially sighted people. These features include high-contrast colour schemes, larger fonts, increased screen resolution and improvements to the visibility of the mouse pointer and cursors.

Magnification software, often used in conjunction with large monitors to increase the viewing area, increases the size of text, menus and icons on a screen. Market leaders are Lunar, MAGic, ProVision32 and ZoomText. Some screen-magnification programs also provide speech output as well, but not usually to the same standard as screen readers.

Daisy talking books

Daisy is an internationally agreed format (sometimes known as an alt format) for talking books intended to increase the proportion of books and other material available in spoken form. It is aimed at people with vision impairments, those with learning difficulties, such as dyslexia, or those who have physical difficulties handling a book. The typical digital talking book displays the text of a work and highlights it as it is read out by software, using either a pre-recorded human or synthetic voice.

Users can adjust text to make it more readable and search for keywords and phrases or skip from one part of a book to another in either the text or

audio modes. Other features, such as bookmarks and underlining, add to the usefulness of digital talking books. Daisy is designed to be independent of hardware and software. It can be stored on CDs, DVDs or memory sticks and played on PCs or a variety of specialised hardware. Books can also be sent over the internet in MP3 and WAV formats.

Enlarged keyboards

People with sight problems usually learn to touch type, which means that they will not have to see the characters on the keyboard in order to use the PC. However, it takes some time to master this skill, so there are aids to help users find their way around a keyboard while they learn. For example, large-print keyboards, with keys four times the size of normal ones, keytop stickers with bigger, more visible fonts, along with a glove with enlarged key markings that stretches over a keyboard, are all available.

Closed circuit television magnifiers

There is a bewildering array of different magnifying aids based on digital cameras. Some are small and extremely portable; others are more bulky and designed to be used in one location. Users place printed matter and other objects under a camera and a magnified image is displayed on a television screen or a computer monitor. Images of the text can be manipulated to improve their readability by changing colours, contrast levels and so on. Some of the systems can be manipulated to pick-up images from across a room - for example someone making a presentation.

Optical character recognition software

An optical character recognition (OCR) program can be used with a PC and a scanner to copy printed text to a computer and store it electronically so it can be read by a screen reader or enlarged with magnification software. OCR packages designed for vision-impaired people include Kurzweil 1000, Cicero, Open Book, Scan and Read and Text Cloner. OCR software for sighted people can also be used by people with vision impairments. The mainstream software is cheaper than those products designed for users with sight problems, but because they are designed for sighted users they could prove difficult to operate with magnification, speech or Braille.

Stand-alone reading machines

Stand-alone reading machines are an option for people who do not have a PC or do not want to use one. They combine a scanner and OCR software with speech synthesis software so that printed text can be scanned and read by the same machine. The document is captured by the scanner, changed into text by the OCR software and then read out in synthetic speech. The design of the controls and the speed of scanning and speech synthesis may be important in selecting a machine.

Some reading machines also store documents. Others have features to make it easier to scan open books. Chatterbox, Portset Reader, ReadEasy, ReadAnywhere, SARA and ScannaR, are among the leaders in stand-alone reading machines.

There are two products on the UK market – CapturaTalk and knfbReader - that use OCR software to convert text captured by a mobile phone camera into speech. The knfbReader was developed by Raymond Kurzweil, the inventor of optical scanning. It is a combined digital camera and personal digital assistant (PDA). The camera is used to take a photo of a piece of text, which the PDA then

reads and converts into sound. The knfbReader helps visually impaired users by enabling them to read product labels in shops, restaurant menus, bills and receipts and essential public safety notices.

Large-screen monitors

Larger-sized monitor screens are invaluable for users who need to increase the size of the text they are working with, or those who regularly use screen-magnification software. The greater viewable area offered by a larger screen allows magnified content to remain within its wider working context.

Braille displays and printers

Electronic Braille displays consist of pins made of metal or nylon, which are electronically controlled to move up and down to display a Braille translation of characters that appear on a computer screen. The displays are available as separate devices or are incorporated into keyboards or portable notetakers.

Each Braille character is made up of 6 dots, but there are several codes in use. Grade 1 Braille mostly represents each print character as one Braille cell, but many experienced Braille users read and write grade 2 Braille, which is a form of shorthand where groups of letters may be combined into a single Braille cell.

Embossers print Braille output from a computer by punching dots onto paper. They connect to the computer in the same way as text printers and can also be connected to notetakers and other devices with a serial or parallel port. Braille translation software is used in conjunction with an embosser to translate printed text into Braille.

Speech-recognition software

Speech-recognition software has been around for 30 years or more, but the technology has improved a great deal recently. The latest software boasts 99 per cent recognition accuracy, provides users with an alternative to typing text into a computer and is designed to be used in conjunction with a variety of mainstream application packages. Top-of-the-range systems come with a complement of smooth-sounding male and female voices.

However, speech-recognition software usually requires effort to train the system to recognise a user's voice and is not usually the recommended option for a person who is blind or partially sighted who can learn to touch-type. This is because the combination of equipment that is required to make voice in and voice out work together is expensive and requires extensive training.

Dragon NaturallySpeaking is probably the best-known speech-recognition package. The latest Dragon software is more accurate than its predecessors and the program can turn voice into text or commands at speeds up to 160 words per minute, which is faster and more precise than typing, says the company.

Haptic systems

Haptic (from the Greek word *haptikos*, meaning 'able to touch') technology has been applied to make touch screens, particularly on smartphones, such as the iPhone and Blackberry, more accessible. Areas of the screen are made to vibrate to indicate the position of buttons, menu items and so on. Different vibrating signatures can be used to identify a range of different buttons. One Samsung phone has up to 20 different vibrations. Nokia has used the technique in prototype software that spells out Braille characters one by one on screen.

Notetakers

Notetakers are specialised portable computers designed for blind people to record information at meetings, or during phone calls. Information can be entered by means of either a QWERTY keyboard or via a Braille keyboard that has six keys and a space bar. The devices do not have a screen; a speech application or Braille embosser may be used to access information. Some notetakers have a Windows-based operating system, and it is possible to run speech applications on off-the-shelf laptops.

Mobile phones and PDAs

Although visually impaired people can use a mobile phone or a PDA, many of the features that rely on visual cues are unavailable to them. Voice facilities and global positioning system (GPS) navigation software have been added to phones and PDAs over the last two years, either as an integral part of the device or as add-on software. Screen readers such as Pocket Hal from Dolphin are now available in a cut down form to run on handheld devices.

Highly complex mobile information systems are also being developed to help disabled people get about more easily. An EU funded project called Mapped, which aims to build a personal digital assistant (PDA) for blind people has developed prototype devices that provide accessible travel information on the move. The PDA talks to a central server via the General Packet Radio System, downloading information about routes, timetables and services to a user.

The system is designed to guide blind people along roads and help them decide what transport they should use to get to their destination. The system is intended to provide travellers with everything they need to know in order to complete their journey, including information on gradients, levels, kerbs, the state of buildings and so on.

Podcasting

Podcasting is a technology in which verbal information is downloaded as MP3 files via links in Really Simple Syndication (RSS) feeds. Action for Blind People is a just one organisation that is using the technology to deliver information in audio form from its website. Audio content reduces the need for screen readers and assistive technology, which greatly increases the accessibility of information.

Talking office equipment

People with vision-impairments often have difficulty using office equipment, such as copiers and fax machines, that feeds back information visually and asks users to make selections from small display screens. Xerox has kitted out some of the copiers in its range with software that allows disabled users to control the machines from a PC rather than having to use the standard control panel.

The Xerox Copier Assistant software emulates a copier's touch-screen controls and allows users to employ assistive software, such as text-to-speech and screen-magnification programs, to operate the machine. Controlling the copier from a PC also makes it easier for wheelchair users to make copies. A PC is plugged into a copier via a USB or RS232C cable and can carry out 80 per cent of a copier's normal functions. Activities that involve handling the copier have been omitted from the Copier Assistant.

9.2 Hearing

Less than two thirds of deaf and hard-of-hearing people are in work, according to a survey conducted by The Royal National Institute for Deaf people (RNID), which says this compares with 75 per cent of the general population. Among the technical aids the RNID recommends to employers who want to make it easier for deaf people to work for them are:

- providing communication support to enable deaf or hard-of-hearing people to participate in meetings;
- installing a loop system in meeting rooms to help hearing aid users;
- making text phones available to allow a deaf person to communicate with a hearing person by phone;
- ensuring that the fire alarm system has flashing lights and/or anyone with a hearing problem is issued with a vibrating pager in case the building has to be evacuated.

Typetalk

Typetalk is a national service for deaf and hard-of-hearing people that involves the use of a text phone (a telephone with a display and keyboard attached) to access the services available on standard telephone systems. Deaf people can make and receive calls from ordinary telephones via a Typetalk operator who transcribes what is said into text for the hearing impaired person and vice versa. Ofcom, the telecom watchdog, now requires mobile phone networks to allow deaf people to use the RNID Typetalk relay service while on the move and to access emergency services.

Text phones

Conversational text (also known as interactive text) is similar to making a voice call, but correspondents use text rather than speech to converse. Deaf people make a call by dialling someone, having a conversation in text and hanging up again at the end. Each letter a user types during the call goes straight to the other person's screen.

The RNID has introduced a service called TalkbyText that provides digital, real-time, character-by-character text calls from phones and PCs. TalkbyText offers faster communication than analogue technologies and allows deaf and hard of hearing people to make calls via Typetalk.

Video interpreting

With over 50,000 people who regularly speak in British Sign Language (BSL) and only a few hundred people to translate for them there is a serious shortage of interpreters in the UK. One solution to this problem is to use video to provide a relay service similar to the Typetalk relay service. A company called Sign-now.com provides an internet based service which allows sign language users to talk to one another using webcams or to hearing people via an interpreter.

Subtitles

As video material becomes increasingly available at home and at work, subtitling has become more of an issue for deaf people. Although the BBC subtitles all of its TV and iPlayer output, subtitling is not available on all programmes. Much material released on DVD also has subtitles. Some DVDs have subtitles especially for deaf people. These are more descriptive – they describe a particular noise or the type of music playing. Many pre-recorded videos have subtitles for deaf people. These are specially coded subtitles called closed-caption subtitles.

Loop and infrared systems

Loop systems amplify sound from voices or other sources direct to a hearing aid. Infrared systems usually send signals to headphones, a stetoset or neckloop. Loop and infrared systems are commonly installed in theatres, meeting rooms, conference halls and lecture rooms. They are also found in airports, shopping centres and bus and train stations.

Telephones

There is a huge range of telephones on the market for people with a hearing loss. Many have features such as flashing lights, handset amplification, variable tone controls and inductive couplers for hearing aid wearers. For deaf people, text messaging on mobile phones has provided a new way to communicate and is easy to learn. However, mobile phones can interfere with hearing aids.

9.3 Learning disabilities

A learning disability affects the way someone learns, communicates or carries out everyday activities. There are many different types of learning disability. Mencap, the charity that represents people with learning disabilities, advises organisations producing material that might be read by people with learning difficulties to write in plain language, add pictures and images to support the text and to pay attention to layout and design. Technology aids are also available — particularly for people with dyslexia.

Aids for dyslexia

Dyslexics often have to cope with a variety of difficulties including writing, spelling, reading large amounts of text, carrying out calculations, understanding maps and generating ideas on paper. Sometimes they can be helped in their text-based tasks by having auditory and graphical feedback. It is the multi-sensory approach of many electronic aids that helps those with dyslexia cope with work.

Using a recorder to remember important conversations, meetings or telephone messages can be very helpful for those who need to re-listen to what has been said in order to make accurate notes. Coloured overlays, glasses and lamps with coloured films help those with poor visual processing skills that may not necessarily be linked to bad sight. Poor visual processing can result in tracking problems: reversing letters, failing to notice whole words, jumping lines of text and skipping sections. Changing the desktop colours on a computer can help, as well as finding the most comfortable font, spacing and column widths. Mindmapping programs, such as Inspiration, MindManager or Mindgenius, can help people to plan work.

Symbols

Symbols are used widely to help children and adults with learning difficulties. Their use ranges from helping people who have difficulties learning to spell, through to those who are not able to use traditional text as a means of reading and self-expression. Tens of thousands of symbols have been devised under various systems. Several software companies have developed programs for reading and writing based on symbols.

9.4 Mobility

Speech-recognition software

Speech-recognition software coupled to a lightweight, wireless microphone offers hands-free computing. This technology helps people with upper-body mobility problems be as productive as their unimpaired colleagues as it negates or reduces the need to use a keyboard and a mouse. For the same reason, speech recognition can also play a key role in alleviating the suffering experienced by those with a desktop-related RSI injury.

Switches

Some manufacturers have developed switches that users can connect to on-screen keyboards or operate with assistive software so that they do not need to strike keys on a stand-alone keyboard. Devices range from simple on/off switches to more complex arrangements based on wheelchair joysticks. They come in various forms from large, brightly coloured buttons to small pipes that a user holds in the mouth and sucks and puffs through to execute commands. With the aid of such input switches, users can control virtually any programmable device by manipulating on-screen keyboards or pointers to select commands and enter text.

Keyboard alternatives

The layout of the computer keyboard dates back to the 19th century when keys were arranged to minimise the chances of typewriter keys clashing when they were struck rapidly. Even with the addition of function keys and keys for other special purposes, the basic design of the computer keyboard has changed little in 30 years.

However, developers have improved the usability of keyboards with larger keys that are easier to strike and key guards that guide users' fingers into position, making it difficult to accidentally hit the wrong key. And there are many novel keyboards that are designed to prevent people from developing upper-limb disorders or to limit aggravation if they already suffer discomfort in their hands or arms.

In addition, there are short keyboards that minimise hand movements, single-handed keyboards and keyboards that are hinged in the middle so that they can be adjusted to fit the most comfortable hand postures for typing.

Software improvements have made keyboards easier to use too. Sticky keys, for instance, allow users to hold down the shift, control and alt keys with just one finger. Operating systems have options for adjusting the key repeat rate or for ignoring keys that are accidentally pressed more than once. Word-prediction software also helps to cut down the amount of keystrokes a user has to make.

Headpointers

The technology for controlling a computer through head movement has been around for decades and offers access for many people, including those who have RSI, a high spinal injury or have had a stroke. What has changed in recent years has been the emergence of new or improved headpointers that lower the bar in terms of price, convenience and usability.

They have been supported by new software features that accommodate the needs of a greater range of users. Advances in other areas have had an effect too; combining headpointing with modern speech-recognition technology, for

example, further speeds up accessibility. Headpointers stand or fall by the software that are used to support them — especially in terms of features such as dwell selection, jitter control (which irons out any tremors that would hinder dwell selection), pointer acceleration and smoothness settings.

Eye-gaze systems

Eye-gaze systems are at the cutting edge of software technology. These programs, originally designed to be used by the advertising industry to study the reaction of consumers to adverts, track the position of a user's irises, mostly by means of infrared beams directed at their eyes. The software detects what a user is looking at on-screen and with the aid of an on-screen keyboard can be used to control a computer and enter data into it.

Repetitive strain injury

Repetitive strain injury is a growing problem for workers. Already as many as one in four suffer from pain in their upper limbs or neck, and that number is likely to grow as more and more work revolves around keyboards.

Repetitive actions, fast pace, poor posture and fatigue are the main causes of keyboard discomfort. Some companies are now marketing ergonomic management systems that measure a user's activity and alert them to possible harmful behaviour. One of the key features of these programs is the way they inform a user that it is time for a break, or even freeze the keyboard to force a worker to take a break.

The programs measure keystrokes, mouse movements and clicks. They even record periods when people sit still since that too puts stress on a body. Ergonomic management software also questions users on how they use their systems and then coaches them on how to improve their posture and keyboarding habits. Some companies have set up web-based programmes that send out regular bulletins to workers and encourage them to adopt healthy routines at their workstations.

Much discomfort can be avoided simply by adjusting equipment correctly to avoid working with bent wrists, arms stretched out while using a mouse or with necks cricked awkwardly towards screens. Simple changes can make a lot of difference. For example, changing a stand-alone keyboard that has a rarely used number pad on the far right-hand side for one without allows the new keyboard to be placed more squarely under the centre of the screen. This reduces the offset angle between looking down at the keyboard and then up at the screen. It also allows the mouse to be operated closer to the keyboard and reduces stretching. Over time, user strain is greatly reduced because comfort is measurably enhanced.

Investing in comparatively inexpensive hardware including track balls, ergonomic mice and adjustable keyboards can stave off RSI too. One of the more unusual aids is a touch-sensitive mouse, which squeaks when clicked overly hard. A team at Loughborough University created the device to alert stressed workers that they are risking damage to nerves by clicking too vigorously.

9.5 Communication

Communication aids

A communication aid helps a person to overcome problems with speaking, reading and writing and communicate more effectively. Communication aids, such as the voice synthesis program used by Professor Stephen Hawking provide a means to assemble messages and communicate them by synthesised voice or in text. Aids range from simple letter boards to sophisticated pieces of computer equipment. Portable PC-based devices are available that are fully functioning computers, environmental control systems and sophisticated communication aids.

The more complex aids have the ability to hold a large number of messages. With these, the user can quickly choose from a wide range of selections using just a limited number of keys and, therefore, communicate relatively quickly and effectively. Different messages are selected by the user pressing a combination of keys, or by using a touch screen display that changes so that the user is presented with different arrays of messages. Many users of electronic aids use a symbol or pictorial system. For those users who are able to spell, more complex machines allow them to type in messages that the machine then turns into speech via a speech synthesiser.

Appendix 1 Disability and the law

The rights of disabled people to be treated equally are enshrined in many national and international laws. In many countries new laws relating to accessibility are being introduced and existing ones strengthened. Any organisation operating international IT services must be aware of the local requirements in the countries that they serve. Regulations differ from one country to another as many governments have opted for their own accessibility standards.

Disability discrimination Act

Under the UK's Disability Discrimination Act 1995 it is unlawful for an employer of any size to discriminate against someone defined as disabled for a reason that relates to their disability. The range of people who are protected under the Disability Discrimination Act from being treated unfairly is very broad.

There is no definitive list of conditions or disabilities; instead the Act is based on the impact of a recognised physical, sensual or mental condition. And it includes those with age-related or chronic conditions such as a worsening hearing, rheumatism or arthritis, health conditions such as a heart disease, diabetes, HIV, renal failure or sickle-cell anaemia.

Organisations are required by the Act to make reasonable adjustments to the way they supply services so that they include disabled people. Those reasonable adjustments cover websites (they are regarded as supplying a public service), and the hardware and software used by both employees and customers to access IT systems.

IT suppliers are not covered by the Act, in that they have no obligation to make the products they sell accessible. It is the responsibility of IT users to ensure that they comply with the law. For this reason it is important for IT departments to satisfy themselves that they are keeping within the law. So far there have been no prosecutions under the Act of website owners or of IT departments for failing to comply, although there have been a handful of out of court settlements and some high profile prosecutions in the US involving the Target super market chain and in Australia over websites connected with the Olympics.

What are reasonable adjustments?

There are no hard and fast rules about what constitutes a reasonable adjustment, although many alterations are common sense and can be inexpensively made. Changes may be required in the way that an organisation delivers and supports a service. Premises may need to be adapted and alterations made to equipment, signs and lighting. Employers may also have to look at ways to better communicate with disabled people. It may also help to give staff advice and possibly training on the issues facing people with a disability.

Although there is no clear definition of a reasonable adjustment, courts are likely to take a dim view of organisations that:

- fail to make simple adaptation available, such as alternative keyboards and mice where necessary;
- fail to arrange a proper assessment of needs and options for someone with a disability who wishes to use their services;
- implement an IT strategy or applications that cannot accommodate the most frequently needed adaptations and alternatives for disabled users.

In addition, employers are expected to be:

- flexible about hours - allowing disabled employees to have different core working hours and to be away from the office for assessment, treatment or rehabilitation;
- provide training;
- procure modified equipment;
- make instructions and manuals more accessible;
- provide a reader or interpreter.

Disability Equality Duty

Public authorities have special obligations to support disabled people under the Disability Equality Duty, which came into force in December 2006. The Duty, which is an extension of the Disability Discrimination Act, calls for the public sector to root out institutional discrimination and create positive attitudes towards disabled people.

Councils, government departments and other bodies are required to draw up a three-year Disability Equality Scheme with an action plan. They must involve disabled people in planning the scheme, gather evidence about the current situation and demonstrate that they have made improvements afterwards. Public sector organisations have used online questionnaires to poll disabled people, mount hearts and minds campaigns, develop bulletin boards and surf the net for ideas about how to fulfil their obligations under the new law.

US legislation

The US has passed the most detailed and far reaching laws relating to accessible IT. In 1998, Congress required Federal agencies to make their electronic and information technology accessible to people with disabilities. Under Section 508 of the Americans with Disabilities Act, agencies must give disabled employees and members of the public access to information that is comparable to the access available to others.

‘Section 508 was enacted to eliminate barriers in information technology, to make available new opportunities for people with disabilities, and to encourage development of technologies that will help achieve these goals’, explains the US General Services Administration, which oversees the legislation.

The law applies to all Federal agencies when they develop, procure, maintain, or use electronic and information technology. One of the key aspects of the American legislation is that disabled people are not required to ask for adaptations. The laws require agencies to make adjustments before hand. For example, a Federal agency that purchases a new phone system must provide telephone amplification at each phone station, so that future employees or guests with hearing loss will be able to use the phones without making special requests.

The US authorities hoped that the purchasing power of the American government would help drive the introduction of accessible technology in both the public and private sectors. The legislation has undoubtedly spurred the development of adaptive technology, even though the Federal market represents only around 2 per cent of IT sales in the US. Local authorities have also introduced similar laws to Section 508.

European legislation

There is not yet any accessibility-specific legislation at EU level. Nevertheless, there are a number of pieces of legislation affecting broadcasting, telecommunications and copyright. Standard setters are also working on Mandate 376, which aims to increase the public procurement of accessible ICT products and services.

Appendix 2 Access to Work

Access to Work is a scheme, administered by Jobcentre Plus, which pays grants to employers to help disabled people get a job or to keep a job if they are already working. Access to Work covers a wide variety of help, from assistive IT and other equipment, alterations to premises, the provision of a support worker and contributions towards the cost of getting to work. It even includes meeting the cost of hiring an interpreter to ensure good communication at an interview.

‘The advice, financial assistance and practical support available to employers and disabled employees through Access to Work helps to ensure that employers need not be concerned about possible financial and technical issues arising from the appointment of a disabled person,’ observes the Disability Employment Coalition. ‘It ensures that disabled applicants, like other candidates, are more likely to be considered on the merits of their application alone.’

Access to Work applies to most jobs whether they are full time, part-time or indeed just temporary posts. Employees undergo an assessment of their needs by an Access to Work assessor.

The Department for Work and Pensions (DWP), which administers the grants, is at pains to point out that the scheme does not replace the normal responsibilities of the employer to implement health and safety regulations or replace the responsibilities required by the Disability Discrimination Act, which demands that employers themselves pay for reasonable adjustments.

Grants made under Access to Work are to cover the additional costs incurred because of a disability. They cannot be used to provide support usually provided by employers or required under legislation for all their employees. Access to Work makes grants to employers who must first pay for adaptations and then claim the money back from the DWP. If an employer takes on an unemployed person or has recruited someone less than six weeks ago, the grant is up to 100 per cent of the costs approved under the scheme.

For those who have worked for an employer for more than six weeks, the grant is up to 80 per cent of the approved costs over the first £300 for help costing up to £10,000. The DWP pays all of the costs for anything over £10,000. Employers will be reimbursed for all of the cost of support workers, fares to work; and communicator support at interviews whatever the status of a disabled employee. Disabled employees can take their grant with them if they move job. Grants are normally made for up to three years.

Appendix 3 Useful sources of information

Ability magazine

Ability magazine is a campaigning publication for people who have difficulty using IT. It is aimed at those who buy, run and use accessible systems.

<http://www.abilitymagazine.org.uk/>

Tel: 01444 831226

AbilityNet

Provides information on computer access for disabled adults and children, at home, at work or in the classroom, offering a full range of services including free advice and information, awareness training, individual assessment and the supply of computer equipment.

<http://www.abilitynet.co.uk/>

Tel: 0800 269 545

Aidis Trust

The Aidis Trust has 30 years experience providing disability computing hardware, software and services including a helpline and online information and advice.

<http://www.aidis.org/>

Tel: 0207 426 2130

Adobe Accessibility

Adobe runs a useful website with help for authors and developers working with Flash, Acrobat and other Adobe products.

<http://adobe.com/accessibility>

Association of Disabled Professionals

The organisation aims to improve the education, rehabilitation, training and employment opportunities available to disabled people.

<http://www.adp.org.uk/>

Tel: 01204 431 638

British Computer Association of the Blind

BCAB is a self-help group of vision-impaired computer professionals and users and was founded in 1969. The organisation runs a Blind Trainer Certification Scheme (BTCS).

<http://www.bcab.org.uk/>

Tel: 0845 430 8627

DeaFinIT

Run by the Heathcote Education Trust, the organisation assists deaf people to gain IT-related work.

<http://www.disability-cambridgeshire.org.uk>

Tel: 01223 569600

Equality and Human Rights Commission

The EHRC has taken over the work of the Disability Rights Commission, an independent body set up by the Government to help eliminate discrimination against disabled people and to promote equality of opportunity.

The DRC's site, which contains a variety of resources, is still available at <http://www.drc-gb.org/>

The EHRC is at <http://www.equalityhumanrights.com/>

Employers Forum on Disability

The leading UK employers' organisation focusing on disability, with several hundred blue-chip members. It was set up to make it easier both to employ disabled people and serve disabled customers.

<http://www.employers-forum.co.uk/>
Tel: 0207 403 3020

Emptech

Database that provides information resources on assistive technologies that are designed to help those with specific disabilities work and study more effectively. The database includes product descriptions, links to manufacturers, suppliers and their addresses, as well as other related resources.

<http://www.emptech.info/>

FAST (The Foundation for the Advancement of Assistive Technology)

Aims to facilitate the advancement of assistive technology by liaising between research and development institutions, manufacturers, service providers and end-users.

<http://www.fastuk.org/>
Tel: 01865 227 599

Guild of Accessible Web Designers

GAWDS is a worldwide association of organisations and accessible web designers and developers — designed to both promote and protect accessible design standards.

<http://www.gawds.org/>

Humanity

A global organisation with the aim of reducing and then eliminating the comparative disadvantage caused by the continuing rapid development of information and communications technology.

Tel: 01273 834 321

IT Can Help

An organisation of volunteers which provides disabled people with help using their computers.

<http://www.itcanhelp.org.uk>
Tel: 0800 269545

Royal Association for Disability and Rehabilitation (RADAR)

RADAR is a national network of disability organisations and disabled people. It represents members by relaying their opinions and concerns to policy-makers and legislators in Westminster and Whitehall, and launching campaigns to promote equality for all disabled people.

<http://radar.org.uk>

Remploy

Offers employment services for disabled people and employers, plus other business services including IT equipment and recycling.

<http://www.remploy.co.uk>

RNIB (Royal National Institute for the Blind)

Provides information and practical services to help blind people live their lives. RNIB says it challenges all who put barriers in the path of blind and partially sighted people.

<http://www.rnib.org.uk/>

Tel: 0345 023 153

RNID (Royal National Institute for the Deaf)

Aims to be a powerful force for change with government and public and private sector organisations, and to provide services directly to deaf and hard-of-hearing people to improve their everyday lives.

<http://www.rnid.org.uk/>

Tel: 0808 808 0123

Shaw Trust

Charity that champions the abilities of disabled people, enabling over 60,000 people per year experiencing all types of disability to make the most of their skills, abilities and employment opportunities.

www.shaw-trust.org.uk

Tel: 01225 716300

Web Accessibility Initiative (WAI)

Guidelines for creating accessible websites.

<http://www.w3.org/WAI/>

BCS
The Chartered Institute for IT

First Floor, Block D
North Star House
North Star Avenue
Swindon SN2 1FA
T +44 (0) 1793 417 425
F +44 (0) 1793 417 444
<http://www.bcs.org/contact>