

BS 8878:2010



BSI Standards Publication

Web accessibility – Code of practice

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Foreword

Publishing information

This British Standard is published by BSI and came into effect on 30 November 2010. It was prepared by Technical Committee IST/45, Web accessibility. A list of organizations represented on this committee can be obtained on request to its secretary.

Relationship with other publications

This British Standard is based on PAS 78:2006, which will be withdrawn.

Information about this document

The content of PAS 78:2006 has been fully revised and updated to reflect current good practice in the building and maintenance of accessible web products.

Use of this document

As a code of practice, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this British Standard is expected to be able to justify any course of action that deviates from its recommendations.

NOTE 1 See also 4.1.

Presentational conventions

The recommendations in this standard are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller, indented type, and does not constitute a normative element.

The word "should" is used to express recommendations of this standard. The word "may" is used in the text to express permissibility, e.g. as an alternative to the primary recommendation of the Clause. The word "can" is used to express possibility, e.g. a consequence of an action or an event.

Notes and commentaries are provided throughout the text of this standard. Notes give references and additional information that are important but do not form part of the recommendations. Commentaries give background information.

NOTE 2 Annex A contains a list of documents referenced normatively; Annex B contains a list of terms and definitions. Annex C to Annex O are informative annexes providing information and guidance; they are intended to be read in conjunction with Clause 1 to Clause 8 of this British Standard.

Additional material supporting the case for BS 8878 is indicated by numbers in square brackets, which cross reference to a list in the Bibliography.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

In particular, attention is drawn to the Equality Act 2010 [1] and the Disability Discrimination Act 1995 (DDA) [2]. References to the law in this British Standard are intended as general information only. Any opinions expressed are those of the committee responsible for this British Standard and do not constitute legal advice.

Introduction

A web product in this British Standard:

- is defined as any website, web-service, or web-based workplace application (e.g. web-based email interface) which is delivered to users via Internet Protocol, through a web browser;
- includes: web-based virtual learning environments, Rich Internet Applications (RIA), "Software as a Service"/Cloud computing services provided through a browser; and internet-enabled "widgets" that can be run inside and outside the browser using desktop runtimes such as Java or Adobe Air;
- could be viewed on different internet-enabled platforms, including computers, mobile phones and other internet-enabled devices such as eBook readers, tablets and televisions.

NOTE 1 A web-service in this standard is defined as a set of web products that are made available for use by audiences (the general public, or the more limited and controlled audiences of intranets or extranets) via IP and HyperText Transfer Protocol (HTTP).

NOTE 2 While this standard does not go into detail on how to make internet-enabled applications which run outside the browser (e.g. Apple iPhone apps or Nokia Ovi apps) accessible, most of the guidance in this standard can be used to inform their design and development (see also 7.3.1).

NOTE 3 This standard does NOT cover the general accessibility of desktop software, as other standards (such as BS EN ISO 9241-171) already address this.

Many web products unnecessarily exclude disabled or others with accessibility requirements, for example older people aged 60 or over, which may leave organizations subject to legal challenge. However, by following good practice in creating, updating or procuring web products, this exclusion generally can be prevented.

This British Standard sets a process rather than technical specifications. It brings together and summarizes important information needed to enable organizations that create web products to understand:

- how to create organizational policies to embed accessibility concerns into their business as usual; and
- how to ensure they consider the needs of disabled and older people at all stages of the web production process.

There are three main drivers for organizations to take steps to make their web products more accessible and usable.

Legal reasons (see Annex C):

- If an organization's web product is not accessible to a disabled person, that person might have grounds for making a claim against the organization under the Equality Act 2010 [1] or the Disability Discrimination Act 1995 (DDA) [2].

Commercial reasons (see Annex D):

- Accessible web products can be used by a much wider audience than inaccessible web products, opening products up to the widest pool of potential users/customers.
- The numbers of people who could benefit from more accessible web products, or could be excluded from products which are not accessible, are significant.
 - There are more than 11 million disabled people in the UK [3].
 - There are nearly 12 million people of state pension age [4] who, while they may not be legally considered disabled, could experience difficulties using technology caused by the effects of age-related capability change. The number of people aged 60 or over is projected to rise by over 50 per cent in the next 25 years [5].

- There are also many other non-disabled people who could benefit from more accessible web products [6]. These people include, for example: the 7 million adults in England with a reading age of less than an 11 year-old [7]; and people who temporarily do not have use of one of their senses due to illness or because they need that sense to do something else at the same time.
- Moreover, web products which include content with accessibility features such as text alternatives to images and captions for videos are more highly visible to search engines. These features can lead to improved Search Engine Optimization resulting in increased audience numbers.

Ethical reasons:

- The Digital Britain report [8] details the many benefits that modern digital technologies can bring, and has developed into the UK Government's active eAccessibility Action Plan [9]. Many organizations want to ensure that disabled and older people are not excluded from these benefits [10] and are able to use new technologies to increase their ability to live independently and to be fully engaged members of society.
- This is reinforced by the United Nations Convention on the Rights of Persons with Disabilities [11] which includes obligations for countries (including the UK) to promote "universal design" of products which are "usable by all people, to the greatest extent possible".

There are also cases which bring together all three of these drivers. These include the importance of ensuring all workplace web products are accessible, as they ensure employment opportunities and employment retention is maximized for the widest possible range of ages and abilities, which benefits society, employers and employees.

1 Scope

This British Standard gives recommendations for building and maintaining web products that are accessible to, usable by and satisfying for disabled and older people.

It gives recommendations for:

- how organizations should ensure accessibility is considered in their web strategy by creating an organizational web accessibility policy (see 4.2 and 4.3). Organizations should also assign a role to be responsible for ensuring that all web products and services produced or procured are in accordance with this policy;
- how to embed the consideration of accessibility decisions through the entire process of producing web products, and document and justify these choices in the product's accessibility policy (see 4.4 and 4.5);
- how to consider the impact of the purpose of the product, its target audience and their needs, the product's choice of platform and technology, and whether to adopt an inclusive design approach or one which also includes an element of user-personalization;
- how to best use existing web accessibility guidelines (or accessible web production tools) in the process of producing accessible web products;
- how to ensure that web products being procured rather than created are selected or specified in such a way as to assure their accessibility; and
- how to assure web accessibility throughout a web product's lifecycle, by considered use of various research and testing methodologies (including the involvement of disabled people) at key points in the production process; and
- how to communicate the web product's accessibility decisions to its users at launch, through creating and publishing its accessibility statement (see 4.4 and 4.6).

BS 8878 is applicable to all types of organization. These include: public and private companies, non-profit organizations, government departments, local councils, public sector organizations and academic institutions.

The audience for this document includes:

- whoever is ultimately responsible for the policies covering web product creation within an organization and governance against those policies (e.g. Chief Executive Officers, Managing Directors, Headteachers, Information and Communication Technologies (ICT) managers);
- people responsible for promoting and supporting equality and inclusion initiatives within an organization (e.g. Human Resource (HR) managers or those responsible for Corporate Social Responsibility);
- procurement managers (e.g. those responsible for procuring web products or the tools to create them such as content production systems or virtual learning environments);
- web production teams (e.g. product owners, project managers, technical architects and web developers, designers, usability and accessibility engineers, test engineers);
- people with responsibility for creating or shaping online content (e.g. website editors, marketing managers, web content authors);
- people who create web production, testing or validation tools; and
- people who write and deliver training courses in web production, design or coding.

Other audiences that might also be interested in this British Standard include:

- assistive technology creators, vendors and trainers who need insights into how their technologies impact on the production of accessible web products; and
- those disabled and older people whose web accessibility needs the Standard aims to support and present.

2 Normative references

The documents listed in Annex A are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

3 Terms, definitions and abbreviations

The terms, definitions and abbreviations used in this British Standard are given in Annex B.

4 Embedding web accessibility within an organization – Responsibilities and documentation

COMMENTARY ON CLAUSE 4

This clause is split into subclauses, by audience.

- Subclause 4.1 is intended to be used by the person in charge of standards compliance in the organization.
- Subclauses 4.2 and 4.3 is intended to be used by the person in charge of policy in the organization.
- Subclauses 4.4, 4.5 and 4.6 are intended to be used by staff involved in the production of web products in the organization (especially web product or project managers).

4.1 Claims of conformity with BS 8878

COMMENTARY ON 4.1

As a code of practice, this British Standard takes the form of guidance and recommendations. It is not to be quoted as if it were a specification and particular care is to be taken to ensure that claims of conformity are not misleading.

This British Standard sets a standard for the quality of the process of creating accessible web products, rather than a standard for the quality of accessibility of web products resulting from it.

Organizations wishing to claim conformity with BS 8878 should:

- address all of the recommendations of this British Standard;
- be able to justify any course of action that deviates from this British Standard's recommendations; and
- document their decision processes (in hard copy or electronic media) to provide evidence of following the recommendations and guidance in this British Standard.

In making such a claim, an organization should be specific about the basis on which it is made and should have evidence to support the claim. The claim may be based on self-assessment, or by an assessment carried out by another party.

4.2 Setting web accessibility responsibility and policy for the organization

As part of an organization's strategy for dealing with accessibility and eAccessibility in general, the organization should ensure that a department or specified role is responsible for the organization's compliance with BS 8878.

NOTE 1 This specified role might be, for example, the Chief Technology Officer, User Experience Director, Web Development Director, Public Relations Director, Communications Director or Marketing Director depending on the size and structure of the organization.

Through this department or role, the organization should:

- analyse the organization's business to consider how web accessibility will affect what it does, including:
 - the organization's legal duties under the Equality Act/DDA (see Annex C for information);
 - (for public bodies only) the organization's duties under the Public Sector Equality Duty;
 - the potential business benefits of web accessibility (for example, those outlined in Annex D);
 - the steps that can be taken to create or procure web products which give disabled and older people a user experience that is as close to the standard enjoyed by non-disabled people as can be reasonably achieved (see Clause 6).
- prepare a web accessibility policy for the organization (see 4.3). This could form part of the organization's suite of accessibility policies covering accessibility of buildings or software, or could stand alone;
- delegate web accessibility responsibilities across the different departments/functions of the organization (as suggested in Annex F) and ensure those people are adequately trained to be able to fulfil these responsibilities; and
- take responsibility for ensuring that the organization implements and maintains the web accessibility policy.

NOTE 2 The Employers' Forum on Disability has an Accessibility Maturity Model which is a very useful reference in enabling organizations to see the levels of maturity in web accessibility they could aim to achieve. A summary "dashboard" of the model is available from: <http://www.onevoiceict.org/tools/tr-tools.asp>.

4.3 Definition of an organizational web accessibility policy

NOTE An example organizational web accessibility policy can be found in E.1.

An organizational web accessibility policy should explain an organization's commitment to web accessibility and summarize its approach. This may include: where accessibility considerations have been included in the organization's wider web policies and standards, for example:

- the organization's web procurement policy (see 6.11);
- the organization's web technology policy (see 6.12);
- any policies or standards the organization has which should hold (at least as the default position) for all of its web products, for example:
 - on compliance with web accessibility standards such as those provided by W3C-WAI (see 6.13);
 - on the degree of user-experience the organization usually aims to meet in its web products (see 6.7); and
 - on support of browsers, operating systems and assistive technologies (see 6.10).

4.4 Creating accessibility policies and statements for each web product

Each of the organization's web products should have its own web product accessibility policy (see 4.5).

A web product's accessibility policy should be based on the broad strategic aims set out in the organization's web accessibility policy (see 4.3), but tailored to the specifics of the web product in question.

The product's accessibility policy should be created at the initial conception of a web product and be an active document into which each accessibility decision made over the product's lifecycle (after launch as well as before launch – see the steps in Clause 6) is documented.

NOTE For the purposes of this documentation, it is up to the organization to define what it regards as an individual web product.

- The organization might consider a web product to be the result of any web project it embarks upon (so every update to a large website might be considered a new web product). Alternatively it might take a lifecycle view of a product, where a web product is created, and new projects to update or augment the project are written into that web product's policy, rather than prompting a new policy document.
- Where a complete transaction requires the use of a set of web products (e.g. if different steps of the transaction were developed or procured at different times or from different suppliers) it is important to consider the accessibility of each web product. The overall degree of user experience for the transaction will necessarily be determined by the weakest web product in the set.

The product's accessibility policy should be accompanied by an accessibility statement, created and published on the web product when it launches (see 6.15). The accessibility statement summarizes the policy for users (see 4.6) and should always reflect the current state of accessibility of the web product.

The organization should ensure that a person in the product's production team takes responsibility for keeping the product's accessibility policy and statement up-to-date throughout the product's lifecycle.

4.5 Definition of a web product's accessibility policy

NOTE An example web product accessibility policy can be found in E.2.

A complete accessibility policy for a web product should:

- be used to store the accessibility requirements and aims that have been decided on for the product in the initial requirements analysis for the product. This will include:
 - the purpose of the product (see 6.1);
 - the target audiences for the product (see 6.2);
 - research on the target audiences' needs (see 6.3);
 - the platform and technology preferences and restrictions of the product's target audiences (see 6.4);
 - a decision on the relationship the product should have with its target audiences (see 6.5);
 - the user goals and tasks the product needs to provide (see 6.6);
 - degree of user-experience the product will aim to provide for each combination of user group and user goal (see 6.7);
 - the accessibility production approach to be used (see 6.8);
 - the delivery platforms the product will support (see 6.9); and
 - the target browsers, operating systems (OS) and assistive technologies the product will support (see 6.10).
- be referenced during the procurement process in invitations to tender and contract documents. It should contain accessibility requirements for contractors (i.e. web development agencies) undertaking the development and maintenance of the web product (see 6.11);
- be used to store the rationale behind the choice of the web technologies used in the web product's creation, and any alternative versions that might need to be created if non-accessible technologies are to be used (see 6.12);
- be referenced during the production process for all decisions on how web guidelines should direct production (see 6.13);
- be used to store the accessibility test plan for the product (see 6.14) and all findings and decisions made as a result of implementing that test plan;
- be used to keep an ongoing register of the cumulative level of accessibility risk (the accessibility limitations resulting from the decision, and whether these are likely to result in the exclusion of any potential users) and the financial or other costs of all decisions made throughout the product's lifecycle (see Clause 5), including:
 - any decision to aim below a usable degree of user-experience for all user groups across all core user goals (see 6.7); and
 - any decision to downgrade the product's degree of user-experience from the degree defined in the accessibility policy to a lesser degree in order to meet launch deadlines (see 6.14), including documentation of the accessibility limitations accepted in this downgrade.
- be used as the source for information in the product's accessibility statement (see 6.15) on the product's launch; and
- include the date it was last updated, and be maintained post-launch in the light of any post-launch updates to the product or complaints from users (see 6.16).

4.6 Definition of a web product's accessibility statement

NOTE 1 An example web product accessibility statement can be found in E.3.

The role of the web product's accessibility statement is to inform disabled and older people about:

- how they can get the most accessible experience when using the web product by customizing the experience to suit their individual needs (see Annex H), either through:
 - using the accessibility customization controls in their browser or operating system; or

NOTE 2 The statement needs to include information on where these customization controls can be found in all of the web product's target web browsers (see 6.10). As these controls are often in a different place in the menus of different browsers, and this placement can change between different versions of the same browser, organizations may consider providing this information by linking to a third-party repository or repositories of this information, for example the BBC My Web My Way website (<http://www.bbc.co.uk/accessibility>) or W3C's "Better Web Browsing: Tips for Customizing Your Computer" (<http://www.w3.org/WAI/users/browsing>). These include up-to-date libraries of browser customization information for all popular web browsers and operating systems in the UK.

- using the preference setting, adaptation or version selection tools the web product provides or responds to, where a user-personalized approach to accessibility has been chosen (see 6.8).
- any accessibility limitations the web product has, any plans to fix these limitations, and any alternative accessible means which have been provided to get around these limitations (see 6.14); and
- contact mechanisms for disabled and older people who wish to request further information about the web product's more detailed accessibility policy, or to lodge accessibility suggestions, comments and complaints with the organization.

NOTE 3 These contact mechanisms need to be sufficient to ensure that all disabled and older people have at least one mechanism they find accessible to provide this feedback. In practice, an email address or contact form is usually sufficient as a contact mechanism. Organizations wishing to provide other mechanisms could also include details for: telephone, textphone or typetalk.

NOTE 4 To advise disabled and older people on how to most effectively provide this feedback, the accessibility statement could include a note recommending they read World Wide Web Consortium (W3C) Web Accessibility Initiative's (WAI) guide for "Contacting Organizations about Inaccessible Websites" (<http://www.w3.org/WAI/users/inaccessible>) before contacting the organization.

After this information, the accessibility statement may include a summary of the product's accessibility policy to show how accessibility has been catered for in its production. This may include a reference to the W3C guidelines and specifications that the web product upholds.

NOTE 5 If the statement claims conformance with WCAG (see 7.1.1.1), it should be in line with W3C requirements for conformance statements available from:
<http://www.w3.org/WAI/WCAG20/quickref/#conformance-reqs>.

However, the organization should avoid the inclusion of technical terms and jargon in the accessibility statement. It should not assume a knowledge of the relative roles of a browser, a search tool and a web page, as many less experienced web users may have difficulty understanding this. It should communicate using clear and easy language so that as many of the web product's users can understand the accessibility statement as reasonably possible.

The accessibility statement should also include the date when it was last updated and the date by which it will be reviewed/revised.

5 How to make justifiable decisions on accessibility options at each step

Many of the steps in the process for creating accessible web products (see Clause 6) include a number of options that the organization could take for dealing with accessibility at that step of the process.

At each step, the organization should carefully consider which of the options it will choose, be able to justify its choice based on reasoned evidence, and detail it in the web product's accessibility policy.

The organization generally should choose the option that maximizes accessibility. Where that option is not selected, the organization should be able to justify its decision. Its reasons for that decision should be recorded in the web product's accessibility policy.

Factors relevant to such a decision may include:

- the extent to which it is practicable for the organization to choose more accessible options;

NOTE 1 A more accessible option would be one that provides a greater degree of user-experience for a particular audience, or provides the same target degree of user-experience to a wider range of users;

- the financial and other costs of choosing more accessible options, considering the financial and other resources of the organization, and the amount of any resources already spent on making adjustments for accessibility;

NOTE 2 While most aspects of delivering accessibility do not necessarily cost much time or money, especially if addressed at the outset of the web production process, some aspects (notably user-testing, and provision of subtitles, signing or audio description for video content) can be costly. Thus accessibility costs needs to be factored into budgeting from the start of the process, so that decisions which have a financial implication at later steps of the process can be properly considered rather than discounted because no budget has previously been set aside.

NOTE 3 Organizations will get better at estimating the potential costs of making different types of web product accessible with experience, but the process has been designed to ensure that all of the relevant information and choices which can fundamentally impact accessibility costs are captured in the first ten steps of the process, before the creation or procurement of the web product is undertaken.

- the extent of any disruption the work would cause; and
- the nature of the benefit, including the number of disabled and older users who would benefit from more accessible options, and the impact on each of these users if the web product excludes them.

NOTE 4 Audiences that organizations might need to justify their decisions to include:

- any (internal) stakeholders who want to assess the level of accessibility risk in decisions made on the web product, both in the requirements stages (steps 1–10), and in any decisions around how much risk is advisable when making launch decisions (step 13);
- their disabled and older users – through the summary of these decisions in their web product's accessibility statement (see 4.6); and
- any party who is assessing their claims of conformity with BS 8878 (see 4.1).

NOTE 5 UK law does not expect organizations that provide web products to the public to anticipate the needs of every user. However, organizations are required to think about and take reasonable steps to overcome barriers that may impede people with different kinds of disability. Statutory guidance on the Equality Act [1] provides that once an organization has become aware of the

requirements of a particular disabled person who uses or seeks to use its services, it might then be reasonable for the service provider to take a particular step to meet these requirements. "This is especially so where a disabled person has pointed out the difficulty that they face in accessing services, or has suggested a reasonable solution to that difficulty," it says. The guidance lists factors that help to determine whether any adjustment is reasonable. These factors do not include the number of people affected by an accessibility barrier. Reasonable adjustments are addressed at C.3.1.

6 The process for creating accessible web products

COMMENTARY ON CLAUSE 6

The organization needs to ensure that accessibility is taken into account at all points of a web product's lifecycle – every decision will affect whether the resulting product will include or exclude disabled and older people.

- Ensuring you have the right research and understanding in the initial conception and requirements analysis for the web product: see steps 1 to 6 (6.1 to 6.6).
- Making strategic choices based on that research: see steps 7 to 11 (6.7 to 6.11).
- The decision whether to create or procure the web product in-house or contract out externally: see step 11 (6.11).
- The production of the web product: see steps 12 and 13 (6.12 and 6.13).
- The evaluation of the product: see step 14 (6.14).
- The launch of the web product: see step 15 (6.15).
- Post-launch maintenance: see step 16 (6.16).

Iteration should be used to progressively eliminate uncertainty during the development of web products (especially during steps 13 and 14). Iteration implies that descriptions, specifications and prototypes are revised and refined when new information is obtained in order to minimize the risk of the system under development failing to meet user requirements.

This process is very similar to the user-centred or human-centred design process detailed in BS EN ISO 9241-210 that many organizations may already follow.

Where the limited resources of the organization or the small size of the web product make the costs of following every step of the process prohibitive, organizations are advised to consider choosing the cheaper or quicker options at each step, rather than omitting steps.

6.1 Step 1: define the purpose of the web product

COMMENTARY ON 6.1

The purpose of the web product can have a huge impact on how it could be made accessible. See Annex G for examples of aspects of common Web 2.0 products such as social-networking sites, video-based sites, online games, "Software as a Service" sites and web products that create web products (content management systems, site builders and blog sites) which make them particular accessibility challenges.

If the purpose of the web product is to replace a non-digital service (for example, a phone helpline), and that existing service will be discontinued when the product is launched, disabled and older people are likely to expect the web product to be at least as accessible as the existing service.

The main purpose of the product (what users will expect to achieve when using the product) should be defined, and documented in the product's accessibility policy.

NOTE The more detailed user goals that the target audiences will come to the web product to achieve will be defined in Step 6 (see 6.6).

6.2 Step 2: define the target audiences for the web product

The target audiences for the web product should be defined, depending on:

- whether the organization is in any way able to predict or control the audience of the web product. For example: is it designed to be an internal (intranet) or organization-to-organization (extranet) web product?

NOTE 1 It is harder for an organization to predict the audiences for its internet sites (who could be any member of the public, worldwide) than the audiences for its intranet or extranet sites (as these audiences will be its staff, and the staff of its partner organizations, all of whom will have a login that the organization controls).

- whether the purpose of the web product is designed to appeal to a particular audience. For example, an educational site might be specifically targeted at students of a particular age. A site to help older users get started on the internet might be specifically targeted at those older users, and anyone helping them.

NOTE 2 Where a web product is targeted at a particular audience, care ought to be taken to not unreasonably exclude potential secondary audiences from being able to use the web product. For example, educational sites might be used by a secondary audience of parents wishing to check out the appropriateness of the site for their children.

NOTE 3 While it might be reasonable to include or exclude user groups from the web product's target audiences based on age, disabled users should not be excluded from the product's target audiences on the basis of their disability.

NOTE 4 However, where a web product is targeted at a particular disabled audience, it may be reasonable to exclude other disabled audiences from being able to use the web product if the needs of the targeted audience and other disabled audiences clash. For example, an online audiogame created specifically for blind people might reasonably exclude people with hearing impairments.

- whether the organization wishes the web product to be used by the widest range of audiences.

This definition of the web product's target audiences may be useful later in the process in any situations where it is not possible to satisfy the needs of all potential audiences as they diverge or contradict each other. Where this occurs the needs of target audiences ought to take precedence over the needs of other audiences.

NOTE 5 Defining a number of target audiences does not mean that everyone else is excluded; it just means that the requirements, design and testing activities will focus on these user groups as the most likely users of the web product.

6.3 Step 3: analyse the needs of the target audiences for the web product

The needs of disabled and older target audiences for the web product should be considered alongside the needs of non-disabled target audiences in the requirements analysis phase of the web production project.

The organization should research its target audience's needs by doing desk research into the general needs of the product's target audiences, taking special note of the general needs of disabled and older people (see Annex H which provides a summary of these needs for many different groups of disabled and older people, and links to other useful sources of information).

The organization could go further and do ethnographic research into the context, preferences and specific needs of the product from a representative sample of the target audiences. (See 8.2 for details on possible research methods.)

To help communicate these needs throughout the web production project, the production team might decide to generate “personas” for the different target audiences for the product. These personas are precise descriptions of a model user from each target audience and what they wish to accomplish with the web product. Personas can serve as an aid to summarizing and communicating an audience’s defining characteristics and needs across the production team. If this is done, these personas should be based on the best, most up-to-date research the organization can find.

All work done in researching the needs of the product’s disabled and older target audiences should feed specific accessibility requirements into the requirements specification of the web product. They should be used to inform all accessibility decisions made from this point onwards in the web production project, and be documented in the product’s accessibility policy.

6.4 Step 4: note any platform or technology preferences and restrictions of the web product’s target audiences

Any information found about the platform or technology preferences and restrictions of the web product’s target audiences should be specifically noted in the product’s accessibility policy.

EXAMPLES

- Some office workers or school or university students might be restricted by using a “standard desktop” or organization-issued mobile device, which may dictate the operating system, browser, the preferences they can set in their browsers, or the assistive technologies they can install.
- Some disabled people might be restricted in their choice of assistive technology by cost. For example, a blind person may have a costly screenreader provided for them at work, but only be able to afford a free screenreader at home.
- Some disabled people who use the accessibility features present in most browsers may be resistant to updating their browser as the menu locations of the control panels to turn on these features can vary quite considerably between versions of a browser which can prevent them being found.
- Some older people might be using older browsers, and have difficulty in understanding how to update their browsers or install plug-ins. They might therefore need web products to be delivered solely using technologies supported “out of the box” in older browsers.
- Some older people might have a preference for viewing web products on IPTV (IP television) platforms. These are simpler than computers and consequently are less vulnerable to threats that cause concern about safety (for example: viruses or phishing emails).

This information will be of use when making decisions between inclusive design and user-personalized approaches to accessibility (see 6.8), and the browsers and assistive technologies that the web product will support (see 6.4).

6.5 Step 5: define the relationship the product will have with its target audiences

The organization should choose whether the audiences for its product will be considered to be:

- individuals, each of whom can get a personalized experience, usually via a login or cookie; or
- more general groups of users, where a group is defined as all users with a common set of needs

EXAMPLES

- Educational establishments, eLearning websites, staff intranets, and any website where users become a member by creating a login (such as social networking sites) are more likely to regard their users as individuals with whom they have entered a relationship. This might set up an expectation of an individualized user experience in the mind of their users. These user expectations, once set up, might extend beyond general personalization facilities like rating or the creation of member pages, to include an individualized approach to dealing with their accessibility needs.
- More traditional public internet sites are more likely to consider their users as user groups, and not raise user expectations beyond this lower level.

This choice, which should be documented in the product's accessibility policy, will fundamentally impact whether a personalized accessibility approach may be possible and suitable for the web product (see 6.8).

6.6 Step 6: define the user goals and tasks the web product needs to provide

The user goals and tasks (e.g. buy a book) that need to be supported on the web product should be defined.

NOTE 1 Goals are what users come to a site to achieve. Tasks are how they achieve these goals. It is these tasks that are validated during requirements gathering sessions and tested during user evaluations. See Annex I for examples of product purposes, audiences, goals and tasks.

At this point of the production process the organization might do further research into the specific product goals that are most important to the web product's different target audiences. This would be to understand and define the core user goals that the target audiences will come to the web product to achieve, so the product can be designed to best enable those audiences to achieve those goals (prioritized over other less important goals). These insights could be added to the personas being used to model the audiences, if these are being used.

The success criteria should also be defined, for use in assessing whether the product, once created, enables its target audiences to achieve those goals.

NOTE 2 Examples of success criteria can be found in Annex J.

The user goals and tasks, their prioritization, and success criteria, should be documented in the product's accessibility policy.

6.7 Step 7: consider the degree of user-experience the web product will aim to provide

COMMENTARY ON 6.7

The organization may decide to create standards which prescribe a general degree of user-experience (e.g. usable) that it will aim for in all of its web products (see 4.3).

However, the degrees of user-experience the organization aims to implement for each user group and goal for a web product might differ from that standard. They will very much depend on the type of web product and the amount of challenge (including cost) in enabling the different degree of support for each user goal.

See I.3 for examples of degrees of user-experience for common user goals on different Web 2.0 web products.

Consideration should be given to three potential degrees of user-experience for enabling the product's users to achieve their goals through the web product.

- Technically accessible: For example, is it technically possible for users to access the information or perform the steps needed to accomplish the task?

- Usable: For example, are users able to effectively and efficiently complete tasks?
- Satisfying/enjoyable: For example, are users satisfied with the experience; is the experience enjoyable, if it is supposed to be?

NOTE The terms effective, efficient and satisfying here are derived from BS EN ISO 9241-12. Satisfying has been separated from effective and efficient in this Standard as it can be a more challenging aim to achieve for disabled and older users than effectiveness and efficiency.

The organization should define the degree of user-experience it will aim to implement for each combination of user group and user goal, and document the reasons for choosing that degree in the product's accessibility policy.

Technical accessibility does not guarantee people with disabilities equivalent access to people without disabilities. Therefore, organizations should be able to justify any decision which does not aim to provide a usable degree of user-experience for all user groups across all core user goals. Such a decision will increase the level of accessibility risk in the product and should be noted as an accessibility limitation in the product's accessibility policy (see 4.5).

6.8 Step 8: consider inclusive design and user-personalized approaches to accessibility

The organization should define the production approach it will use to build accessibility into the web product for its target audiences.

Two useful approaches are:

- An inclusive design approach (see BS 7000-6). When applied to the design of web products, this aims to ensure accessibility via following recognized guidelines or techniques known to assure accessibility (such as WCAG; see 7.1.1.1) to a wide-range of audiences without the need for special adaptation, other than the use of assistive technologies. It also relies on user-testing the web product with a representative range of users from the product's target audiences for verification.

NOTE 1 Inclusive design, as used here, is similar to Universal Design, as defined in the United Nations Convention on the Rights of Persons with Disabilities [11]. The difference is that Universal Design requires products to be usable by all people to the greatest extent possible, whereas Inclusive Design requires products to be usable by as many people as reasonable or possible, conceding that often in practice trade-offs have to be made between the conflicting needs of different user groups. Where such trade-offs need to be made, the organizations should justify the reasonableness of its decision in the product's accessibility policy.

- A user-personalized approach. This could be provided by a system which enables users to specify their accessibility preferences, and then adapts products automatically to suit those preferences, and/or finds a suitable product from a number of alternative versions. Alternatively, a similar level of adaptation to individual needs might be provided manually or with the provision of services or content generated for that user. Systems that incorporate explicit accessibility preferences are the preferred option (see Annex K for more information on this approach).

NOTE 2 The most common example of the product adaptation approach is the inclusion of "additional accessibility provisions" such as text-resizing controls or "speak this page" functionality in web products. This is usually done where research into the needs, preferences and restrictions of the product's target audiences (see 6.2) suggests that a reasonable number of the product's users might be unable to use the accessibility features in their browser or operating system (for example, if local administration policies disallow this), where assistive technologies do not yet exist, or where the product's users are unlikely to be

able to install or use the assistive technologies needed to make a site based on WCAG accessible.

NOTE 3 An example of the alternative versions approach is the creation or procurement of multiple alternative versions of an eLearning product/resource where research into the needs of the product's target audiences (see 6.2) suggests that different users would be better supported by learning through different learning styles and modalities – for example, graphs will make mathematical equations more easy to understand for most students, but will not make equations easier for blind students, who might prefer an alternative using audio or even touch.

NOTE 4 When using a user-personalized approach, the organization will need to draw boundaries around what needs it will and will not respond to, based on the reasonableness of the costs of responding to those needs (see Clause 5).

This decision should be based on:

- an analysis of the needs of the product's target audiences (see 6.3). In practice, the inclusive design approach often needs to be enhanced by the user-personalized approach where it becomes obvious that the difference between the needs of individuals or groups of users will prevent a "one size fits all" approach giving an experience which works for all;
- any platform or technology preferences or restrictions they have (see 6.4). For example, the provision of "HTML alternatives" to rich-media content, which would require a plug-in to work, for users who cannot install plug-ins in their browser for some reason (even though rich-media technologies such as Flash can now produce accessible web products directly); and
- whether the organization wants to regard users as individuals or user groups (see 6.5). Individualized user-personalized approaches allow users to be treated as individuals.

The reasons for choosing one, or a combination of each, should be documented in the product's accessibility policy.

User-personalized approaches should complement but not be used as a replacement for inclusive design approaches, unless the organization is able to justify the reasonableness of any decision taken to replace upholding a particular WCAG guideline or technique with user-personalized approaches or additional accessibility provisions.

6.9 Step 9: choose the delivery platforms to support

An ever increasing range of devices can be used to access the internet, from traditional computers to internet-enabled TVs, set-top-boxes, mobile phones, and tablets. The organization should be aware that its web products might be accessed by users through web browsers on any of these devices.

NOTE 1 For convenience this standard groups these devices into four platforms, where each platform has a sufficiently different screen size, expectation of the user's proximity to the screen, base input mechanism, and common usage context, to be considered as a candidate for the creation of a different version of a web product.

- Computer (e.g. desktop, laptop, netbook). For example, 1024 x 768 average screen resolution on a 17 inches monitor, 30 cm proximity of viewing, keyboard & mouse input mechanism; primarily solitary usage context.
- Mobile (e.g. mobile phones, internet tablets). For example, screen resolutions of between 94 x 64 and 320 x 480 on screens of 3.5 inches or less; 10 cm proximity of viewing; touch-screen or multi-directional user navigation (e.g. D-Pad or optical trackpad) input mechanism; mobile, totally personal usage context (see also <http://www.w3.org/WAI/mobile/>).

- Games Consoles (e.g. Sony Playstation, Microsoft Xbox, Nintendo Wii). For example, screen resolutions of standard-definition (SD: 800 × 600) or high-definition (HD: 1900 × 1030) on screens of anywhere from 24 inches to 52 inches; 6 feet or more proximity of viewing; gamepad input mechanism; primarily lounge-based solitary or group usage context.
- IPTV (e.g. web-enabled TVs, web-enabled set-top-boxes) – e.g. screen resolutions of SD (800 × 600) or HD (1900 × 1030) on screens of anywhere from 24 inches to 52 inches; 6 feet or more proximity of viewing; remote-control input mechanism; primarily lounge-based solitary or group usage context.

The organization should therefore make a conscious, reasoned decision regarding the degree of support for accessibility it will aim to achieve for users accessing its web product across different platforms, from these three increasing degrees of support.

- 1) Creation of one accessible web product which is optimized for computers only, and expecting that following accessibility guidelines for the creation of that web product will in some way facilitate its usability and accessibility on other platforms (see <http://www.w3.org/WAI/mobile/>).
- 2) Creation of one accessible web product which is optimized for computers, with some added support and testing (usually via device detection and adaptations of the user interface) for ensuring that it gives a usable and accessible experience on a wider set of supported platforms.
- 3) Creation of a set of connected and optimized versions of the web product, one for each supported platform; each version targeted, designed and tested to give an accessible, usable and context-optimized user experience on that platform, including:
 - an appropriate user interface for the device. For example, IPTV products should be designed with a user interface optimized for user input by a remote control, and a display which is designed to be viewed at least six to ten feet away from the big screen. Mobile products should be designed for touch-screen or multi-directional user navigation user input, and a small display which is designed to be viewed in the user's hand, probably on the move; and
 - an appropriate set of functionality for the device in context. For example, IPTV and mobile products will probably include a subset of the functionality of online products due to their smaller screens and slower user input mechanisms. Mobile functionality might also include location-awareness to optimize efficiency of interaction.

NOTE 2 These platform-optimized versions of the web product might be delivered via a "web apps" structure rather than through the browser.

These decisions should be documented in the web product's accessibility policy.

NOTE 3 See C.3.3 for a discussion on how the requirements of UK law impact on decisions of accessibility support across platforms, and Clause 7 for guidelines for development of web products on computer (see 7.1 and 7.2), mobile (see 7.3.1) and IPTV (see 7.3.2) platforms.

NOTE 4 The degree of accessibility that it is possible to aim for will be constrained by whether the platform's infrastructure has the attributes necessary to support the creation of accessible web products (either the combination of WCAG (see 7.1.1.1), ATAG (see 7.1.1.2) and UAAG (see 7.1.1.3) exists for the platform, or a similar combination of guidelines exists for the platform).

Organizations should check:

- Whether its accessibility infrastructure allows for the installation of, and interfacing with, assistive technologies.
- Whether its web browser and/or web apps infrastructure exposes content, structure and functionality to those assistive technologies.

- Whether its web browser and/or web apps include common accessibility settings such as font resizing.

NOTE 5 See also W3C-WAI's useful concept of "accessibility supported" technologies (<http://www.w3.org/TR/UNDERSTANDING-WCAG20/conformance.html#uc-accessibility-support-head>) which is a similar idea for web technologies (rather than platforms).

NOTE 6 While many mobile phone platforms (e.g. Android, Symbian, iPhone, Windows) do include the necessary infrastructure, most IPTV platforms (e.g. Sky, FreeView, FreeSat, Virgin Media) currently do not.

6.10 Step 10: choose the target browsers, operating systems and assistive technologies to support

The accessibility of the web product will be affected by the browsers, operating systems and assistive technologies its target audiences use. Therefore, the organization should choose a set of target web browsers, operating systems and assistive technologies to test the product with, to ensure the product provides the degree of user-experience for which it is aiming.

This choice will be affected by:

- the browsers, operating systems and assistive technologies which are available on the delivery platforms its web product will support (see 6.9);
- whether the organization has any control over the browser, operating system and assistive technologies the web product's target audiences will use. For example, if the product is an Intranet which will only be used by staff members who have been provided with their computers pre-loaded with company-approved browsers, operating systems and assistive technologies (see 6.2), support for those approved browsers, operating systems and assistive technologies will be sufficient; and
- the platform and technology preferences and restrictions of the product's target audiences (see 6.4), depending on the approach to accessibility chosen:
 - Where the organization has chosen an inclusive design approach to accessibility (see 6.8), it should be able to justify the choice of a reasonable subset of the browsers, operating systems, and assistive technologies which are used by the product's target audiences (see 6.4) that it will aim to support.
 - Where the organization has chosen a user-personalized approach to accessibility (see 6.8) it should be able to justify the choice of a reasonable subset of the browsers, operating systems, and assistive technologies which are used by the product's target audiences that it will aim to support, as well as the precise range of individual preferences the product will support through additional accessibility provisions or alternatives.

In practice, the organization might quickly define the product's target web browsers, operating systems and assistive technologies for the web product, by taking it from an organizational-level standard to be used for all its web products (see 4.3), as long as it reviews the appropriateness of this list against the target audiences for the individual web product.

These decisions should be documented in the web product's accessibility policy.

NOTE 1 Categories of assistive technology to consider supporting include: screenreaders, screen magnifiers, voice-recognition systems, and switches.

NOTE 2 Information about which screenreaders are widely used can be found in surveys by WebAIM (<http://www.webaim.org/projects/screenreadersurvey/>) and in the BBC's regularly updated Screen-Reader Testing Guidelines (<http://www.bbc.co.uk/guidelines/futuremedia/accessibility/screenreader.shtml>).

NOTE 3 Information about which browsers are widely used can be found in the BBC's regularly updated Browser Support Standards (http://www.bbc.co.uk/guidelines/futuremedia/technical/browser_support.shtml).

NOTE 4 As accessibility features in browsers themselves can be great enablers of accessibility, the organization needs to consider supporting any browsers which have accessibility features over and above the common set, even if the browser is not widely used. The common set of features are: the ability to zoom a page, zoom just the text on the page, and the ability to override the page colours specified by the designer by allowing the use of a custom cascading stylesheet (CSS).

NOTE 5 In practice, different versions of the same web browser or assistive technology can have hugely different levels of support for accessibility features. Therefore target web browsers and assistive technologies need to include version numbers.

6.11 Step 11: choose whether to create or procure the web product in-house or contract out externally

While it used to be the case that most web products were created "in-house from scratch" the organization now has many more options:

- whether it is going to create the web product in-house; or contract out its creation to an external supplier; and
- whether it (or its external supplier) is going to create the web product from scratch; or create it by selecting and integrating a combination of web-authoring tools, 3rd party software, components or web-services

Each of these two decisions will impact on every step that follows in the process, and so they should be documented in the web product's accessibility policy.

Where the organization contracts out the web product's creation to an external supplier it should assure itself that the supplier is able to deliver the accessibility requirements and aims specified in the product's accessibility policy. The policy should be referenced in all procurement invitations to tender and contract documents (see Annex L) as specified in the organization's web procurement policy (see 4.3).

NOTE Useful questions which the organization is recommended to add to its invitations to tender are detailed in L.3.

6.12 Step 12: define the web technologies to be used in the web product

The underlying web technologies used in the web product can have a huge impact on the ability of the product's developers to produce an accessible web product.

As such, the organization's web technology policy should include requirements that any web technologies used in the production of its web products should support the production of accessible web products.

If the web product is going to be created from scratch, the organization will have the most ability to control the choice of web technologies used in its production. In this case, each technology that it, or its external supplier, proposes to use should be checked to confirm:

- whether the technology has the attributes necessary to create accessible web products. This includes whether the supplier of the technology (e.g. W3C, Adobe, Microsoft) also supplies techniques for developers to use in assuring their web products conform to WCAG (see 7.1.1.1); and
- whether the technology exposes content, structure and functionality to assistive technologies used by disabled and older people. (See the technology sections of Annex H for information on the assistive technologies commonly used by different disabled user groups and older people.)

NOTE 1 See also W3C-WAI's useful document on "accessibility supported" technologies (<http://www.w3.org/TR/UNDERSTANDING-WCAG20/conformance.html#uc-accessibility-support-head>), which is a more complete discussion of this idea.

NOTE 2 There may be circumstances where no accessible technology exists to create a particular type of web product. Possible examples might be: the provision of immersive 3D environments; or mapping and navigation technologies. In these circumstances, non-accessible technologies could be used if alternative solutions and technologies are identified as a route to accessibility for people not able to use the non-accessible technology. This would be an example of the alternative versions approach from **6.8**.

If the web product is going to be created by selecting and integrating a combination of web-authoring tools, 3rd party software, components or web-services, the organization will have less control over the technologies used. In this case, the selection process for each tool, software, component or web-service should assure:

- that the tool, software, component or web-service is able to deliver the accessibility requirements and aims specified in the product's accessibility policy (either inherently, or after customization for its use in the web product), which should be referenced in all procurement invitations to tender and contract documents (see Annex L);

NOTE 3 Useful questions which the organization is recommended to incorporate in its selection process are detailed in **L.3**.

- that where a web-authoring tool is procured to aid in the creation and maintenance of the web product, that authoring tool either satisfies all the checkpoints of ATAG (see **7.1.1.2**), or justifies and documents any deviations from ATAG. Wherever possible, the web-authoring tool itself should also be accessible to disabled web content authors.

NOTE 4 At the time of publication, no single web-authoring tool that supports all ATAG Priority 1 checkpoints is known.

These decisions should be documented in the web product's accessibility policy.

6.13 Step 13: use web guidelines to direct accessible web production

The organization should create its web product, or require the external supplier it has contracted to create the product, to conform with the best accessibility guidelines for the platform and technology they are using, as detailed in Clause **7**.

NOTE 1 Most web accessibility guidelines include guidelines which will impact on each member of a web production team, including:

- guidelines on visual design for visual designers;
- guidelines on interaction design for interaction designers;
- guidelines on content authoring for content authors and editors; and
- guidelines on coding for web developers.

Where guidelines include a number of levels of conformity (for example, the A, double-A, and triple-A conformity levels of WCAG), the organization should choose the conformity level which will provide the degree of user-experience defined in the web product's accessibility policy for each combination of user group and user goal (see **6.7**).

NOTE 2 The level of conformity chosen will have an impact on cost and timescales. The organization should be able to justify its decision, based on the balance between this cost and the benefits to the product's users.

NOTE 3 The organization may decide to create standards which prescribe a specific level of compliance (e.g. WCAG 2.0 level AA) for all of its web products (see **4.3**), or it may have such standards set for by its regulators (e.g. local government having to comply with central government standards).

These decisions should be documented in the web product's accessibility policy.

In the event that it becomes clear during production that it is not possible or reasonable (usually, in terms of costs) to provide the degree of user-experience defined in the web product's accessibility policy for each combination of user group and user goal, the policy should be updated with the justification for lowering the degree of user-experience.

6.14 Step 14: assure the web product's accessibility through production

The organization should integrate accessibility assurance into the web product's production process by:

- (if it is creating the product in-house) creating an accessibility test plan for the product (see 8.3) and ensuring the plan is adhered to through the design, prototyping and build of the product; or
- (if it has contracted out the product's creation to a supplier) requiring their suppliers to create an accessibility test plan for the product (see 8.3) and requiring them to provide evidence that they have adhered to the plan through the design, prototyping and build of the product.

NOTE 1 Organizations regularly contract (or sub-contract) out accessibility testing to external usability or accessibility testing suppliers who are specialists in this field. Useful questions which organizations are recommended to incorporate in their process to select these usability or accessibility testing suppliers are detailed in L.4.

NOTE 2 A crucial aspect of this accessibility assurance work is the decision of how much accessibility risk the organization feels comfortable with when making launch decisions for the web product.

When making decisions about whether the product is ready to launch, organizations should do all they reasonably can to ensure that they have enough evidence from this testing that their product meets the degree of user-experience it decided to aim for (see 6.7).

There may be situations where an organization considers that the benefits of getting their web product first to market (or launched to a particular deadline) outweigh the accessibility risk in launching a product which does not yet meet the degree of user-experience it decided to aim for. In such situations, the organization should:

- carefully consider whether they can achieve an acceptable lesser degree of user-experience while still meeting their launch deadlines; and

NOTE 3 This will introduce accessibility limitations into the product and thus increase its level of accessibility risk.

- attempt to mitigate any remaining accessibility limitations by:
 - making plans for repairs to be made to fix these accessibility limitations, including a reasonable estimate of when the repairs will be made; or
 - providing an accessible alternative means for disabled people to get around the elements of the web product which have these accessibility limitations so they can still achieve their user goals.

NOTE 4 A common example of an accessible alternative means is the provision of a phone helpline for people who are not able to read "captchas" and could thus be prevented from registering for logins on many social networking sites.

The organization should carefully document all such decisions and mitigating factors in the section of the product's accessibility policy on the product's accessibility limitations.

NOTE 5 If the organization cannot mitigate for the product's accessibility limitations it should document an explanation of why it considers it reasonable for the element to remain inaccessible.

6.15 Step 15: communicate the web product's accessibility decisions at launch

The organization should create and publish the web product's accessibility statement (see 4.6) on the web product, at launch, ensuring that the accessibility statement itself is fully accessible to and usable by disabled people, even when other content on the site is not.

NOTE It is recommended that organizations link to this accessibility statement from all pages of the web product (usually by putting the link in the web product's common page header or footer) and should name the link "Accessibility".

6.16 Step 16: plan to assure accessibility in all post-launch updates to the product

Once the web product is launched the organization should:

- ensure that any accessibility limitations that were identified but not fixed pre-launch are addressed within the estimated timescales;
- take care in planning the frequency of any updates to its web products which substantially change the way the product looks or works

NOTE 1 One of the most important usability challenges to the users of a web product over time is how often that website is redesigned. While each of a web product's audiences may experience frustration or difficulty in re-learning how the web product works when the way it looks and works has been updated, disabled and older audiences may be particularly sensitive to this "having to learn it all over again" as they may have greater difficulties in learning how to use new/updated sites quickly and so may give up.

- develop and implement a regular programme of post-launch accessibility testing (see 6.5) to ensure that all updates to the product (whether as minor as an update to a page, or as major as a new release of the product) do not compromise its accessibility;
- regularly review the web product's accessibility in light of new developments in technology

NOTE 2 The Equality Act and the DDA require organizations to anticipate the needs of disabled users and to make reasonable adjustments. Statutory guidance on the legislation states: "a step that might previously have been an unreasonable one for a service provider to take could subsequently become a reasonable step in light of changed circumstances. For example, technological developments may provide new or better solutions to the problems of inaccessible services." It also advises that organizations should: "Review regularly the effectiveness of reasonable adjustments and act on the findings of those reviews." (see Annex C).

- ensure that all feedback about the web product, coming through the accessibility contact mechanisms noted in its accessibility statement, is reviewed; and all correspondence which complains about any aspect of the web product's accessibility is answered in a timely manner; and

NOTE 3 Where complaints include any reference to the law or use the language of litigation the organization is advised to take legal advice on the complaint, before replying.

NOTE 4 A guide to dealing with accessibility complaints can be found in Annex M.

- ensure that the web product's accessibility policy and statement is updated in the light of any post-launch updates to the product or complaints from users.

7 Using web accessibility guidelines to direct the production of accessible web products

NOTE This clause is intended to be read by members of a web product's production team.

7.1 Inclusive design guidelines

7.1.1 Core web accessibility guidelines from W3C WAI

NOTE 1 The World Wide Web Consortium's (W3C) Web Accessibility Initiative (WAI) publishes three sets of guidelines which, when harmonized, increase the likelihood that web products (termed web content by W3C) will be accessible to and usable by disabled people.

- Web Content Accessibility Guidelines (WCAG):
<http://www.w3.org/TR/WCAG20/>.
- Authoring Tool Accessibility Guidelines (ATAG):
<http://www.w3.org/WAI/intro/atag.php>.
- User Agent Accessibility Guidelines (UAAG):
<http://www.w3.org/WAI/intro/uaag.php>.

NOTE 2 The ideal situation for assuring accessible experiences is that organizations produce web products which conform to WCAG, using content production tools which conform to ATAG, and users consume them through user agents (browsers and assistive technologies) which conform to UAAG.

7.1.1.1 Web Content Accessibility Guidelines (WCAG)

COMMENTARY ON 7.1.1.1

WCAG are important accessibility guidelines for all members of an organization's web production team to be familiar with, as they are considered to be the de facto standard for accessible web design world wide. See "Web Content Accessibility Guidelines (WCAG) Overview" at <http://www.w3.org/WAI/intro/wcag> for an introduction and links to WCAG technical and educational material.

WCAG 2.0 introduces a set of principles which are technology agnostic – they can be applied to W3C technologies and non-W3C technologies alike.

To make best use of WCAG the organization might need to create internal documents to provide guidance on interpreting WCAG in the context of the organization. All such documents need to refer back to WCAG to ensure readers are aware of the wider scope of where the guidelines come from, and why they are needed.

Organizations should produce their web products in accordance with the latest, finalized version of WCAG.

NOTE 1 While previous versions of WCAG are useful, organizations should consider updating any web products which conform to previous versions of WCAG to conform to the latest finalized version at the next reasonable maintenance point in their lifecycle (see: <http://www.w3.org/WAI/intro/wcag.php#version> for help in doing this).

Organizations should:

- choose which level of conformity they believe will achieve the degree of user-experience they aim to reach (see 6.7);

NOTE 2 WCAG include testable success criteria at three levels: A, AA, and AAA (see <http://www.w3.org/TR/WCAG20/#conformance> for further information).

- document this aim in the web product's accessibility policy;

- test whether they have achieved that level of conformity in their web product before launch; and
- document this achievement in the product's accessibility policy.

Organizations should use the WCAG accessibility techniques document provided by the W3C (see <http://www.w3.org/TR/WCAG-TECHS/>) or by the supplier of the technology in which they have chosen to build their web product in order to guide its development.

7.1.1.2 Authoring Tool Accessibility Guidelines (ATAG)

COMMENTARY ON 7.1.1.2

W3C WAI has published "Authoring Tool Accessibility Guidelines Overview" [<http://www.w3.org/WAI/intro/atag.php>].

W3C WAI has published a set of companion techniques to help software developers implement ATAG in their products: <http://www.w3.org/TR/ATAG-TECHS>.

W3C WAI has published a document to assist web content developers in procuring authoring tools that uphold ATAG: "Selecting and using authoring tools for web accessibility" [<http://www.w3.org/WAI/impl/software.html>].

At the time of writing, no single web-authoring tool that supports all ATAG Priority 1 checkpoints is known.

Organizations should ensure that any web content authoring tool or Content Management System (CMS) they procure satisfies the checkpoints of ATAG, so that:

- the content it creates is accessible to disabled people; and
- the tool is itself usable by disabled web content developers.

Similarly, if the web product the organization is creating is a tool for authoring web content itself (for example, a blogging tool, an image or video uploading tool, or tool to help people create their own websites) the organization should ensure that the tool is produced to satisfy the checkpoints of ATAG as well as the success criteria of WCAG.

7.1.1.3 User Agent Accessibility Guidelines (UAAG)

NOTE 1 W3C's definition of a User Agent encompasses web browsers as well as assistive technologies.

Organizations should aim to develop web products that achieve the degree of user-experience described in the product's accessibility policy on the range of target web browsers, operating systems and assistive technologies identified in that policy (see **6.10**).

NOTE 2 In theory, all web browsers (on all operating systems) and assistive technologies need to conform to UAAG, so developers can easily ensure their web products are accessible to everyone by ensuring they conform to WCAG.

NOTE 3 In reality, some web browsers and assistive technologies do not keep pace with UAAG.

Organizations should consider creating work-arounds for any accessibility issues they encounter, which are usually found through testing the product with the target assistive technologies (see **8.4.4**). This might be due to some of the range of web browsers, operating systems and assistive technologies they have decided to support not conforming to UAAG.

Organizations should test their web products to ensure these work-arounds provide a usable and accessible experience on the range of target web browsers, operating systems and assistive technologies they have decided to support.

NOTE 4 It is not the responsibility of the organization to ensure that all web browsers or assistive technologies used by their target audiences uphold UAAG, unless the organization also provides those web browsers and assistive technologies (e.g. for their staff to access their intranet – see **6.10**).

NOTE 5 It is the responsibility of user agent developers to comply with UAAG to minimize the need for web product owners to create work-arounds for popular web browsers and assistive technologies which do not conform to UAAG.

NOTE 6 Where organizations find they are spending significant time creating work-arounds for issues arising from different assistive technologies not conforming to UAAG they may wish to engage with the assistive technology manufacturers strategically through the Accessibility Interoperability Alliance (<http://www.aria.org/i4a/pages/index.cfm?pageid=3743>) to enable them to understand the cost implications of their lack of conformity to web product creators.

NOTE 7 W3C WAI has published "User Agent Accessibility Guidelines Overview" <http://www.w3.org/WAI/intro/uaag.php>.

7.1.1.4 Guidelines for Rich Internet Applications (RIAs)

NOTE 1 RIAs are web products which provide the types of interaction and functionality that used to be found solely in desktop applications. They are commonly created using combinations of HyperText Markup Language (HTML), JavaScript, Asynchronous JavaScript and XML (AJAX), Flash, Silverlight and other technologies.

Organizations should produce RIAs in accordance with WCAG, which includes techniques for RIAs from version 2.0 onwards. They should be guided by design techniques and best practice documentation from the vendor of the technology in which they are implementing the RIA.

Organizations that have chosen to create RIAs using AJAX, HTML, JavaScript and related technologies should:

- develop RIAs using relevant specifications (such as WAI-ARIA) and best practices (including, but not limited to, WCAG 2.0's informative techniques); and
- consider using controls/components from a library that has been developed specifically to be accessible, for example from a JavaScript library which already has accessibility plug-ins to allow developers to easily include accessibility functionalities, such as:
 - dojo (<http://www.dojotoolkit.org/reference-guide/dijit-a11y-statement.html>); or
 - YUI3 (<http://yuiblog.com/blog/category/accessibility>); or
 - jQuery (<http://plugins.jquery.com/taxonomy/term/88>).

NOTE 2 WAI-ARIA has great potential for improving the accessibility of dynamic web content. For more information, see <http://www.w3.org/WAI/intro/aria>.

NOTE 3 Accessibility design techniques and developer resources are available for Adobe Flex (<http://www.adobe.com/accessibility/products/flex/>) and for Microsoft Silverlight ([http://msdn.microsoft.com/en-us/library/cc707824\(VS.95\).aspx](http://msdn.microsoft.com/en-us/library/cc707824(VS.95).aspx)).

7.1.2 Other non-British web accessibility guidelines (including Section 508)

NOTE 1 While WCAG are widely recognized internationally, some web products which organizations consider procuring may claim conformity to national guidelines from outside Britain.

Where an organization is planning to rely on a product being compliant with guidelines from another country, it should ensure that it is aware of what those guidelines actually mean.

NOTE 2 Many non-British guidelines are subsets of WCAG (e.g. U.S. Federal Government standards from Section 508 of the Rehabilitation Act – see: <http://www.section508.gov/index.cfm?fuseAction=stdsdoc>) and so are likely to assure a lower degree of user-experience than those conforming to the latest, finalized version of WCAG.

NOTE 3 Section 508 is in the process of being updated at the time of writing this British Standard (see: <http://www.access-board.gov/508.htm>); it is expected that the updated version will be published in 2011.

NOTE 4 For further information see **C.8.2**.

Organizations should therefore not rely solely upon evidence of conformity to non-British guidelines as an indicator of the accessibility of the product, and should check for conformance to WCAG and conduct testing as recommended in Clause 8.

7.2 Personalization guidelines: for individualized web product adaptability

Where an individualized approach to web accessibility is being used, the organization should:

- ensure that all the alternative versions of content in the web product include machine-readable metadata about their accessibility properties (see AccessForAll and ISO 9241-129 in **K.1**); and
- ensure that any tool the web product includes which allows users to specify their needs (their accessibility preferences) is able to export those settings for interoperability to other accessibility preferences systems (see **K.2**).

7.3 Accessibility guidelines for web products on non-computer platforms

7.3.1 Accessibility guidelines for web products on mobile platforms

COMMENTARY ON 7.3.1

Web products have been available on mobile phones since the Wireless Application Protocol (WAP) 1.0 standard was published in April 1998. Since then, the technologies behind the mobile web have evolved to become more and more capable (eXtensible HyperText Markup Language – XHTML) and convergent with computer web technologies (HTML, Flash etc.). The number of people using mobile web products has also increased – initially slowly, and more recently at an accelerating rate (see: <http://www.gsmworld.com/newsroom/press-releases/2010/4614.htm>).

Ofcom's "Media Literacy Audit: Report on media literacy of disabled people – 2006" (http://www.ofcom.org.uk/advice/media_literacy/medlitpub/medlitpubrss/disabled) found that similar percentages of disabled mobile phone owners used the mobile internet each week as non-disabled mobile phone owners.

W3C's Mobile Web Initiative (<http://www.w3.org/Mobile/>) aims to bring together authoring tool vendors, content providers, handset manufacturers, browser vendors and operators to address interoperability issues and the usability and accessibility challenges they bring to the production of accessible web products.

The field of guidelines for the creation of accessible mobile web products is relatively immature.

Organizations creating web products for mobile delivery platforms (mobile handsets and tablet-based computers) should consider the degree of support for accessibility they will design into their mobile web products (see **6.9** and **H.3.3**).

Until more mature accessibility guidelines for web products on mobile platforms emerge, organizations should:

- produce their mobile web products in accordance with a combination of WCAG and W3C Mobile Web Best Practices (see <http://www.w3.org/WAI/mobile/>);

NOTE 1 W3C WAI have published a document to assist web content developers who have created content that meets WCAG 2.0 also meet Mobile Web Best Practices: <http://www.w3.org/TR/mwbp-wcag/wcag20-mwbp.html>.

- take into account the accessibility capabilities and restrictions of the different mobile devices for which they are creating web products. For example WCAG guidelines on keyboard access might not be relevant on devices that do not have a keyboard; and
- NOTE 2 The accessibility settings available on mobile devices from different manufacturers, or different mobile devices from the same manufacturer, can vary enormously. Most mobile device accessibility settings and available assistive technologies are limited in comparison with the settings and assistive technologies available in computer operating systems and browsers. The type of input mechanism used on the device (see 6.9) can also have a huge impact on its accessibility capabilities and restrictions.
- more strongly consider user-testing their mobile web products with disabled and non-disabled people to ensure the product's user experience meets their aims. The limitations of current mobile accessibility guidelines do not provide as much confidence in accessibility assurance as for web products on computers.

7.3.2 Accessibility guidelines for web products on IPTV platforms

COMMENTARY ON 7.3.2

Creating web products for use on IPTVs is likely to become more and more important through the lifetime of this standard, as many people who consider computers too complicated may prefer to get the web through simpler IPTVs.

At the time of writing, IPTV is currently an emerging platform for the creation of web products. Current IPTV platforms, although they include such technologies as web browsers, widgets and web applications, do not include frameworks which support the development of accessible web products, either through accessibility settings in the operating system or browser, or the ability to install or interface with assistive technologies.

Some evolving open IPTV platforms are already planning to include such accessibility frameworks.

Until accessibility guidelines for web products on IPTV platforms emerge, organizations creating web products for IPTV should:

- wherever possible, choose to create their web products for IPTV platforms which include an accessibility framework to allow for the creation of accessible web products;
- create their products in the spirit and principles of WCAG, where these guidelines make sense on the IPTV platform; and
- create IPTV web applications using the guidelines for the creation of mobile applications as a basis for production.

7.4 Guidelines for accessible web design for older people

COMMENTARY ON 7.4

While following WCAG will often result in the creation of web products which are usable for older people as well as disabled people, various organizations have done research into finding specific web design guidelines which can be used to design web products to be as usable and useful as possible to older audiences.

Key accessibility guidelines for older people relate to the following general areas.

- **Simplicity of information and interaction** is a core requirement – in the way information is presented, the way pages are designed, and at a navigational level.
- **Visibility of navigational features** needs to be emphasized – in terms of their ease of activation, associated actions, and their relationship to non-active page content.

- **Display issues** – focusing on making text easy to read, striking a balance between presenting a default appearance of text that does not make reading unduly difficult for older people and enabling user customization to optimize the quality of user experience.
- **Trustworthiness** of content and the content provider – including provision of reassurances over management of submitted data, and accuracy and currency of the information.

W3C WAI's "Ageing Education and Harmonisation" (WAI-AGE) project is working to inform the development of extensions of WAI guidelines which can better promote and meet the needs of people who have accessibility needs related to ageing. This project has produced some useful resources which can be found at <http://www.w3.org/WAI/older-users/>. Their "Web Accessibility for Older Users: A Literature Review" (<http://www.w3.org/WAI/intro/wai-age-literature>) is a particularly useful resource for understanding accessibility for older users (although at the time of writing it is incomplete).

Organizations should ensure that websites and applications are accessible for people with disabilities and older people by conforming to WCAG (see <http://www.w3.org/WAI/older-users/developing>).

In addition, when the target audiences of their web products specifically include older audiences (see 6.2), organizations may consider additional recommendations to further improve usability for older people from the National Institute on Aging (NIA) and National Library of Medicine (NIH/NLM) resource "Making your Website Senior Friendly" (<http://www.nia.nih.gov/HealthInformation/Publications/website.htm>).

NOTE The NIH/NLM resource is referenced here as it is the most comprehensive (provides approximately 80 guidelines), and most cross-referenced and quoted in other guidelines for accessibility for older people.

Some guidelines in WCAG and the NLM guidelines provide differing or conflicting advice – especially on recommendations of the provision of additional accessibility provisions (see also 6.8). Guidelines for older people typically include recommendations that from the W3C perspective relate to browser support and are included in UAAG. However, in reality it cannot be assumed that older web users will use UAAG-conformant browsers.

Where such clashes between guidelines occur, organizations should consider which guideline is likely to provide a better experience for the larger number of the users in their target audiences, choose to use that guideline, and note this decision in the web product's accessibility policy.

8 Assuring accessibility throughout a web product's lifecycle

8.1 Summary of approach

Organizations should ensure that the needs of disabled and older people from the product are gathered at the start of a web product's production, inform the product's accessibility requirements, and are tested throughout the lifecycle of the product rather than treated as an additional discrete testing phase at the end of the project.

NOTE 1 Identifying accessibility issues as early as possible in the lifecycle improves the feasibility of addressing the issues and is likely to decrease the cost of doing so.

Organizations should integrate accessibility assurance throughout a product's lifecycle as follows.

- **Initial production conception and requirements analysis.** Ensure that the needs of disabled and older people are gathered whilst defining the web product's requirements specification (see 8.2).

- **Procurement or production.** Ensure that an accessibility test plan (see 8.3) is created and adhered to for the design, prototyping and build parts of the product's lifecycle. This is to ensure the web product created upholds the degree of user-experience the organization has decided to aim to provide (see 6.7) on its launch.
- **Post-launch maintenance.** Ensure that all post-launch maintenance and updates of the web product are tested to ensure the product continues to uphold that degree of user-experience (see 8.5).

Where reasonable and possible, organizations are encouraged to involve disabled and older users in the web production process to help production teams understand real-world accessibility issues, and implement more effective accessibility solutions.

NOTE 2 W3C WAI's "Involving Users in Web Project for Better, Easier Accessibility" might be of use in planning this involvement – see: <http://www.w3.org/WAI/users/involving>.

8.2 Gathering requirements from disabled users

COMMENTARY ON 8.2

The best method for gathering the requirements depends on a number of factors, including how easy it is to recruit and elicit useful data from people with different disability profiles (see Annex N).

Particularly useful methods which might be used here include contextual research such as "in-depth-interviewing".

- If the web product is a new version of an existing product, or if competitors to the product already exist, this could involve viewing disabled people using the product to identify what elements work for them and areas which could benefit from improvement.
- If the web product is entirely new, this could involve asking users how such a product might fit into their lifestyle, and what elements of it might be most important to them.

If the organization decides to include ethnographic research into the context, preferences and specific needs of the product from a representative sample of the target audiences (see 6.2), it should ensure that:

- disabled and older users are included in this research alongside non-disabled users; and
- the ethnographic research methods chosen should be able to accurately capture disabled and older users' particular requirements.

8.3 Creating an accessibility test plan

COMMENTARY ON 8.3

Where an organization is procuring the web product, or commissioning its production out to a third party, this accessibility test plan will be a crucial document in allowing the organization to specify what sort of evidence they will require for formal acceptance that the web product upholds the degree of user-experience they have specified.

Organizations are strongly advised to harmonize their usability and accessibility test plans for a product. It makes good financial and logistical sense to conduct any usability testing with disabled and older people alongside usability testing of more general audiences.

Organizations should develop an accessibility test plan that enables progress towards the accessibility targets to be measured throughout the web production lifecycle.

The accessibility test plan should clearly state:

- which accessibility testing methods will be used, at what points of the web production process (see **8.4.1** for a guide);
- how the methods will support the production team in assuring progress towards the target degree of user-experience;
- how the test results will be documented; and
- how the test results will be fed back into the web production process to improve the web product.

8.4 Accessibility testing methods

8.4.1 Summary of accessibility testing methods

COMMENTARY ON 8.4.1

The testing methods are described in detail in **8.4.2** to **8.4.7**.

Organizations should use a combination of testing methods depending on the nature of the product being tested and the resources of the organization.

The following methods should be used as a minimum, using an approach that involves inspecting a sample number of pages of the product, where that sample includes pages with high usage and pages that involve critical or complex interactions, such as form filling.

- Validation testing of code to determine whether it meets its technical specifications; tools include validators for HTML and style sheets (see **8.4.2**).
- Manual conformity testing to determine conformity to accessibility criteria that need manual evaluation in WCAG, and conformance to accessibility criteria from ATAG for any authoring components of the web product (see **8.4.3**).
- Assistive technology and browser/OS accessibility setting testing to determine whether the web content can be accessed using the tools commonly used by disabled users (see **8.4.4**).

If this minimum level of testing is decided upon, the organization should include a simple and obvious feedback mechanism for its disabled users on the web product, as a low-cost way of beginning to involve real users in its web production lifecycle.

NOTE 2 The best evidence that a web product complies with an organization's duties under the Equality Act and the DDA is likely to be evidence of successful user testing that involved disabled participants (see **C.8.1**).

The following methods are strongly recommended, and should be used if the organization has the resources to more rigorously test the usability of the web product as well as its technical accessibility.

- Expert reviews on early designs or prototypes (to identify any potential accessibility problems with the visual or interaction design) and finished code (to identify any potential accessibility problems with the coding of those designs). See **8.4.5**.
- User testing with representative users from the product's disabled and older target audiences attempting to achieve tasks based on the web product's user goals. This should be conducted on early designs or prototypes, and finished code. See **8.4.6**.

NOTE 3 While it is possible to user test early design and prototypes with most disabled and older users, some prototyping techniques (for example, Flash prototypes and clickable-jpegs) are difficult to user test with blind people. This is because the prototypes are designed to approximate a product's surface

interaction rather than the underlying semantic interaction which screenreaders use. In such circumstances, an expert review might be used in place of user testing.

The following method should be used for periodically auditing large sites, especially to ensure any maintenance after the web product's launch has not compromised the product's accessibility. It should not be relied on as the sole means of testing.

- Automated conformity testing to determine conformity to automatable accessibility criteria in WCAG (see 8.4.7).

8.4.2 Validation testing of mark-up

COMMENTARY ON 8.4.2

While WCAG, from 2.0 onwards, does not require validation of the mark-up of web products against the validity of their technical specifications (e.g. HTML or CSS) this can still be a useful test to perform to ensure they perform well across a range of web browsers, especially as automated validators exist to help minimize the cost of this testing.

While WAI-ARIA mark-up will not validate in validators before HTML5, this should not prevent organizations using WAI-ARIA mark-up to improve the accessibility of their products.

Validators for commonly used W3C technologies can be found at:
<http://www.w3.org/QA/Tools/>.

Organizations should validate a web product's mark-up with a validator which is either supplied or approved by the creators of the technology the web product uses.

8.4.3 Manual conformity testing

COMMENTARY ON 8.4.3

Manual conformity testing is a systematic manual review of each webpage against a set of guidelines (usually WCAG) which typically follows a validation test and involves reviewing each piece of content and control.

This is necessary for full WCAG conformity checking because most WCAG criteria need human judgement to evaluate correctly.

Organizations should ensure that manual WCAG conformity testing is only carried out by testers who understand the success criteria and spirit of WCAG, and so can produce informed and reliable test findings.

If the web product includes any authoring components, organizations should ensure that manual conformity testing against ATAG checkpoints is performed on these components.

8.4.4 Testing with assistive technologies and browser/OS settings

COMMENTARY ON 8.4.4

Testing with assistive technologies checks whether assistive technologies can read and interact with web content and whether they can activate user interface controls.

Organizations should:

- be able to justify the choice of the assistive technologies and browser/OS accessibility settings they choose to test the accessibility of the product with:
 - at a minimum: testing with a screenreader, a screen magnifier; browser/OS settings for text resizing (the most commonly used browser/OS setting); and the keyboard alone; or
 - preferably: testing with each combination of target browser, operating system and assistive technology defined in the product's accessibility policy (see 6.10); all the accessibility settings in the target browsers and operating systems; and the keyboard alone.

- document this choice in the product's accessibility policy; and
- ensure that the testers carrying out the testing with assistive technologies and browser/OS settings are trained in the use of the technologies, and are using the technologies in the same way a disabled or older person would;
- consider providing work-arounds for any accessibility issues found during such testing due to target browsers or assistive technologies not conforming to UAAG (see 7.1.1.3).

8.4.5 "Expert review" – heuristic evaluations and cognitive walkthroughs

COMMENTARY ON 8.4.5

Expert reviews employ a more rigorous, reliable methodology for finding potential accessibility issues than manual WCAG testing, and are often useful as a pre-cursor to user testing.

Where an organization decides to include expert reviews in the product's accessibility test plan, they should:

- use them on early designs and finished code to identify quality and consistency issues not typically identified during user testing;
- be able to justify the choice of the structured "expert review" methods they choose to test the product with:
 - at a minimum: a heuristic evaluation, where an interface is inspected against a defined set of heuristics or guidelines (this should take WCAG as a base, but also add other checks which the expert has found over time to identify potential accessibility problems which the current WCAG success criteria might miss); and
 - more preferably: a cognitive walkthrough, where evaluators step through a series of actions with a goal of completing a typical user task as if they were an individual user or member of the product's target user groups (and thus using the assistive technology the user would use, if the user uses assistive technology).

NOTE Expert reviews may use simulations of specific constrained browsing situations as a limited, but helpful, way of supporting other evaluation methods where time is short or funds are limited.

- document this choice in the product's accessibility policy; and
- ensure that the testers carrying out the testing are trained in the methodologies and assistive technologies they are using so they can have the best chance of emulating the way disabled and older people would use them, to capture as many of the issues they might face as possible.

8.4.6 User testing with disabled and older people

COMMENTARY ON 8.4.6

User testing with disabled and older people involves recruiting a set of representative users (see Annex N) and asking them to attempt to use the web content to achieve a set of representative tasks. As such it is the best way of checking whether disabled people will be able to use, as well as access, an organization's web products (see Annex O for more details). See also: <http://www.w3.org/WAI/eval/users>.

Criteria for measuring success of a website in enabling users to complete these tasks are set out in Annex J.

Where an organization decides to include user testing with disabled and older people in the product's accessibility test plan, they should:

- use such testing when the web product is nearing completion and launch. Ideally this would be through a number of iterations, where findings from one round of user testing are used to improve the product and are tested again in another round;
- be able to justify their choice of the number of different disabled and older user groups included in the user testing (see Annex N for a list of suggested user profiles to include as user groups);
- be able to justify the number of participants in each user group (i.e. the sample size), which should include a mix of beginners and experienced web/assistive technology users (see also O.3), included in the user testing;
- be able to justify whether they will use a specially trained evaluator or not for this testing (see O.5);
- document these choices in the product's accessibility policy;
- ensure that the testers carrying out the testing are trained in the methodologies they are using, to ensure they do not "lead" users in testing, and that they understand how to analyse testing observations to produce findings which are insightful and reliable (see O.5); and
- ensure that all user testing conforms to BS EN ISO 9241-210 and all testers are aware of best practice Codes of Conduct for testing (see O.6).

8.4.7 Automated (WCAG) conformity testing

COMMENTARY ON 8.4.7

Automated testing tools exist to determine conformity to automatable accessibility criteria in WCAG. These tools can be useful for analysing a whole site and conducting periodic audits.

Where an organization decides to include automated (WCAG) conformity testing in the product's accessibility testing plan, they should:

- use such testing when the web product's page templates are nearing completion, to ensure that accessibility problems are fixed before templates are used to propagate throughout the product; and
- use such testing after launch to ensure that any post-launch maintenance has not compromised the product's accessibility; and
- be aware that only a minority of WCAG criteria can be programmatically verified, so automated testing on its own is not sufficient to check conformity against WCAG or be assured that their products are accessible.

8.5 Post-launch programme of accessibility testing

Organizations should develop a regular programme of accessibility testing after the web product is launched to maintain the degree of user-experience specified in the product's accessibility policy.

This programme of testing should include:

- testing the accessibility of all updates to the product (whether as minor as an update to a page, or as major as a new release of the product);
- small changes, such as adding a new graphic, writing a new paragraph or changing a form should be tested, at a minimum, for conformity to WCAG;

- large changes that affect important tasks within the interface (e.g. how a user logs onto a site or buys a product) should ideally undergo user testing with disabled and older people;
- testing the product with any new assistive technologies, or new versions of existing assistive technologies, which are launched after the web product is launched;
- reviewing feedback provided by the product's users; and
- annually benchmarking the site against the accessibility policy by running user evaluation or conformity inspections to identify any new accessibility problems.

Organizations might also periodically review any new technologies, devices, user behaviours or expectations that would change disabled and older people's accessibility requirements of the web product.

Annex A **Normative references** (normative)

The following referenced documents are indispensable for the application of this document (for dated references, only the edition cited applies).

NOTE References and web addresses were correct at the time of publication.

Standards publications

BS EN ISO 9241-210, Ergonomics of human-system interaction – Part 210: Human-centred design for interactive systems

Other publications

W3C guidelines and specifications available at <http://www.w3.org>, especially:

- WAI Web Content Accessibility Guidelines (WCAG) – <http://www.w3.org/TR/WCAG/>
- WAI User Agent Accessibility Guidelines (UAAG) – <http://www.w3.org/TR/UAAG/>
- WAI Authoring Tool Accessibility Guidelines (ATAG) – <http://www.w3.org/TR/ATAG/>
- WAI Accessible Rich Internet Applications (WAI-ARIA) – <http://www.w3.org/TR/wai-aria/>

Annex B **Terms, definitions and abbreviations** (normative)

B.1 Terms and definitions

For the purposes of this British Standard, the following terms and definitions apply.

B.1.1 accessibility

usability of a product, service, environment or facility by people within the widest range of capabilities

NOTE 1 The concept of accessibility addresses the full range of user capabilities and is not limited to users who are formally recognized as having disability.

NOTE 2 The usability-oriented concept of accessibility aims to achieve levels of effectiveness, efficiency and satisfaction that are as high as possible considering the specified context of use, while paying attention to the full range of capabilities within the user population.

NOTE 3 In a web context, accessibility means the degree to which people with disabilities can perceive, understand, navigate, and interact with the web, and that they can contribute to the web.

B.1.2 accessibility risk

accessibility limitations resulting from a decision, and whether these are likely to result in the exclusion of any potential users

B.1.3 assistive technology

hardware or software added to, or incorporated within, a system that increases accessibility for an individual

NOTE 1 This includes all such software which is either: installed into the Operating System (executable extensions or applications), installed into the browser (plug-ins), or included on the website.

NOTE 2 Examples include the provision of screenreaders and text-to-speech systems; screen-magnification software; tactile Braille display, trackballs, touch pads/screens, etc.; alternatives to standard computer mice, keyboards, switches and speech recognition software.

NOTE 3 Also referred to as "access technology" and "adaptive technology".

B.1.4 disability

physical or mental impairment which has a substantial and long-term adverse effect on a person's ability to carry out normal day-to-day activities

NOTE This definition is based on the definitions of disability contained in the DDA and the Equality Act. See also impairment (B.1.7).

B.1.5 eAccessibility

accessibility of a broad spectrum of ICT products and services, including: telephony, TV, web and self-service terminals

B.1.6 heuristics

guidelines or rules that are used to guide the process of evaluation

NOTE See 8.4.5.

B.1.7 impairment

physical, sensory or mental or cognitive impairment

NOTE 1 Physical impairments include motor impairments; sensory impairments affect the senses, such as sight and hearing; cognitive and mental impairments include learning disabilities and mental health problems.

NOTE 2 Physical, sensory or mental or cognitive impairments can be linked with a reduction in functionality or strength such as loss of vision.

NOTE 3 Some people may have a number of impairments, and the combined impact of these impairments may be more severe than the individual impairments might indicate in isolation.

NOTE 4 Impairments can differ in severity amongst individuals; an individual's impairment may also fluctuate in severity and impact over time, often unpredictably.

B.1.8 older people

people aged 60 and over, who might or might not experience difficulties using technology caused by the effect of age-related capability change

B.1.9 organization

company, non-profit organization, government department, local council, public sector organization or academic institution

B.1.10 plug-in

piece of software users need to enable them to view non-HTML content (such as Portable Document Format (PDF) files, Flash or Java) in their browser

NOTE May be pre-installed in the browser; or may need to be found on the Internet, downloaded and installed into the browser by the user.

B.1.11 rich internet application (RIA)

dynamically refreshing web products which provide the types of interaction and functionality that used to be found solely in desktop applications

B.1.12 set-top-boxes

device that connects to a television and an external source of signal, turning the signal into content which is then displayed on the television screen or other display device

B.1.13 subtitles

text versions of the spoken word, used to allow the content of web audio and video to be accessible to those who do not have access to audio

NOTE Subtitles is the term used in BS 8878 where captions might be used in other accessibility guidelines like WCAG, as subtitles is a more commonly understood term in Britain.

B.1.14 usability

extent to which a web product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use

[adapted from BS EN ISO 9241-11:1988, definition 3.2]

B.1.15 web content author

individual or organization responsible for authoring web content, as distinct from designing it, or coding it

B.1.16 web product

website, web-service, or web-based workplace application (e.g. web-based email interface) which is delivered to users via Internet Protocol, through a web browser

NOTE 1 This includes: web-based virtual learning environments, Rich Internet Applications (RIA), "Software as a Service"/Cloud computing services provided through a browser; and internet-enabled "widgets" that can be run inside and outside the browser using desktop runtimes such as Java or Adobe Air.

NOTE 2 Web products could be viewed on different internet-enabled platforms, including computers, mobile phones and other internet-enabled devices such as eBook readers, tablets and televisions.

NOTE 3 A web-service in this standard is defined as a set of web products that are made available for use by audiences (the general public, or the more limited and controlled audiences of intranets or extranets) via IP and HyperText Transfer Protocol (HTTP).

NOTE 4 While this standard does not go into detail on how to make internet-enabled applications which run outside the browser (e.g. Apple iPhone apps or Nokia Ovi apps) accessible, most of the guidance in this standard can be used to inform their design and development (see also 7.3.1).

NOTE 5 This standard does NOT cover the general accessibility of desktop software, as other standards (such as BS EN ISO 9241-171) already address this.

B.2 Abbreviations

3D	three-dimensional
ADHD	attention deficit hyperactivity disorder
AJAX	Asynchronous JavaScript and XML
ARIA	Accessible Rich Internet Application
AT	assistive technology
ATAG	Authoring Tool Accessibility Guidelines
BSL	British Sign Language
CD	Compact Disc
CMS	content management system
CSS	cascading style sheet
DDA	Disability Discrimination Act 1995
DWP	Department for Work and Pensions
EEA	European Economic Area
EHRC	Equality and Human Rights Commission

EU	European Union
EU4ALL	European Unified Approach for Accessible Lifelong Learning
HD	high-definition
HMRC	Her Majesty's Revenue and Customs
HR	human resources
HTML	HyperText Markup Language
HTTP	HyperText Transfer Protocol
ICT	information and communication technology
IP	Internet Protocol
IPTV	Internet Protocol television
IT	information technology
LMS	learning management system
MLE	managed learning environment
NIA	National Institute on Aging
NIH/NLM	National Institute of Health National Library of Medicine
OS	operating system
PDF	Portable Document Format
PLE	personal learning environment
RDF	Resource Description Framework
RIA	rich internet application
RSI	repetitive strain injury
SD	standard-definition
SENDO	Special Educational Needs and Disability (Northern Ireland) Order
UAAG	User Agent Accessibility Guidelines
UPA	Usability Professionals Association
VLE	virtual learning environment
W3C	World Wide Web Consortium
WAI	Web Accessibility Initiative
WAI-AGE	WAI "Ageing Education and Harmonisation"
WAP	Wireless Application Protocol
WCAG	Web Content Accessibility Guidelines
XHTML	eXtensible HyperText Markup Language
YUI	Yahoo User Interface

Annex C **Disability and the law** (informative)

NOTE 1 This informative annex provides information and guidance. It is intended to be read in conjunction with Clause 1 to Clause 8 of this British Standard.

NOTE 2 While the information in this annex is intended to be useful to everyone, it is specifically aimed at the department or specified role responsible for the organization's web accessibility policy (see 4.2).

NOTE 3 Annex C is intended as general information only, based on the law at the time of publication. The opinions expressed are those of the committee responsible for this British Standard (details are given in the Foreword). Nothing in Annex C or the rest of this British Standard represents legal advice. The law may change over time and guidance from independent bodies such as the EHRC can be influential so organizations need to keep themselves informed of changes to the law and best practice guidance.

COMMENTARY ON ANNEX C

The Equality Act was passed in April 2010 and most of its provisions came into force in Great Britain in October 2010. It has replaced the legal duties relevant to web accessibility that were contained in the Disability Discrimination Act (DDA) in England, Scotland and Wales. However, the DDA will continue to apply in Northern Ireland. BS 8878 is aimed at readers in Great Britain and Northern Ireland and therefore it refers to both laws.

C.1 The relevant law in the UK

The Equality Act 2010 and the Disability Discrimination Act 1995 (DDA) make the fair treatment of disabled people a legal requirement. If an organization's web product is impossible or unreasonably difficult for a disabled person to access, that organization could be in breach of these laws. That exposes the organization to a risk of being sued for unlawful discrimination.

The DDA applied across the UK until October 2010. It now applies in Northern Ireland only. In England, Wales and Scotland the DDA was replaced by the Equality Act.

Each law places similar duties on the providers of web products. This Annex explains these duties.

C.2 What the legislation says

C.2.1 The legislation in Great Britain

The Equality Act states that it will be indirect discrimination for a service provider to apply "a provision, criterion or practice" which is discriminatory in relation to a person's disability.

A provision, criterion or practice will be discriminatory if it puts disabled people at a disadvantage when compared to others unless the provider can show that it is "a proportionate means of achieving a legitimate aim."

It does not matter whether the service is free of charge or not. Offering a service on different terms to a disabled person can also be unlawful discrimination.

The Equality Act includes a duty on service providers to make reasonable adjustments. This is divided into three requirements.

First, where a provision, criterion or practice "puts a disabled person at a substantial disadvantage in relation to a relevant matter in comparison with persons who are not disabled, [the service provider is required] to take such steps as it is reasonable to have to take to avoid the disadvantage."

Second, "where a physical feature puts a disabled person at a substantial disadvantage in relation to a relevant matter in comparison with persons who are not disabled, [the service provider is required] to take such steps as it is reasonable to have to take to avoid the disadvantage."

Third, "where a disabled person would, but for the provision of an auxiliary aid, be put at a substantial disadvantage in relation to a relevant matter in comparison with persons who are not disabled, [the service provider is required] to take such steps as it is reasonable to have to take to provide the auxiliary aid."

The first and third requirements are relevant to web products. The Equality Act adds:

"Where the first or third requirement relates to the provision of information, the steps which it is reasonable for [the service provider] to have to take include steps for ensuring that in the circumstances concerned the information is provided in an accessible format."

The Equality Act places separate duties on employers. It says that an employer must not discriminate against a person as to the terms on which that person is offered employment, or in the way the employer affords an employee access to opportunities for "training or for receiving any other benefit, facility or service". It is also unlawful for an employer to discriminate against an employee "by subjecting [the employee] to any other detriment." An employer has a duty to make reasonable adjustments.

Education providers face similar requirements. For example, the Equality Act provides that schools and institutions of higher education must not discriminate against pupils and students in the way they provide education, in the way they afford pupils and students access to "a benefit, facility or service" or by subjecting the pupil or student to "any other detriment". A duty to make reasonable adjustments applies to each responsible body.

C.2.2 The legislation in Northern Ireland

The DDA states: "It is unlawful for a provider of services to discriminate against a disabled person [...] in refusing to provide, or deliberately not providing, to the disabled person any service which he provides, or is prepared to provide, to members of the public".

It also makes clear that it is unlawful to discriminate in the standard of service provided to a disabled person or in the manner of its provision.

The DDA continues: "Where a provider of services has a practice, policy or procedure which makes it impossible or unreasonably difficult for disabled persons to make use of a service which he provides, or is prepared to provide, to other members of the public, it is his duty to take such steps as it is reasonable, in all the circumstances of the case, for him to have to take in order to change that practice, policy or procedure so that it no longer has that effect."

The DDA provides that it is unlawful for an employer to discriminate against a disabled employee "in the terms on which he offers that person employment" or "in the opportunities which he affords him for promotion, a transfer, training or receiving any other benefit" or by "subjecting him to any other detriment."

Where "any arrangements made by or on behalf of an employer [...] place the disabled person concerned at a substantial disadvantage in comparison with persons who are not disabled, it is the duty of the employer to take such steps as it is reasonable, in all the circumstances of the case, for him to have to take in order to prevent the arrangements or feature having that effect."

A separate law, the Special Educational Needs and Disability (Northern Ireland) Order 2005 (SEND), prohibits discrimination against disabled pupils and students by schools and institutions of higher education.

SEND provides that "a responsible body directly discriminates against a disabled person if, on the ground of the disabled person's disability, it treats the disabled person less favourably than it treats or would treat a person not having and who has not had that particular disability and whose relevant circumstances, including his abilities, are the same as, or not materially different from, those of the disabled person". It places a duty on such bodies to make reasonable adjustments.

C.3 The law's application to web products

C.3.1 The Equality Act's application to web products

The Equality Act does not mention web products but a statutory Code of Practice published by the Equality and Human Rights Commission (EHRC) makes clear that it will apply to them. The Code states: "Websites provide access to services and goods, and may in themselves constitute a service, for example, where they are delivering information or entertainment to the public."

It provides the following example:

"A provider of legal services establishes a website to enable the public to access its services more easily. However, the website has all of its text embedded within graphics. Although it did not intend to discriminate indirectly against those with a visual impairment, this practice by the provider places those with a visual impairment at a particular disadvantage because they cannot change the font size or apply text-to-speech recognition software. They therefore cannot access the website. As well as giving rise to an obligation to make a reasonable adjustment to their website, their practice will be indirect disability discrimination unless they can justify it."

Another example in the EHRC's Services Code makes clear that an organization cannot "outsource" its responsibilities:

"A council provides information about its leisure service through a website. The council is responsible for ensuring that reasonable adjustments have been made where needed, for example by changing the size of the font, to ensure that disabled users are able to get the information, without being placed at a substantial disadvantage (even if the council employs an external organisation to build and maintain its website)."

The EHRC's Services Code is influential: courts and tribunals have to take into account any part of the Code that appears to them to be relevant to questions arising in proceedings.

The Equality Act provides that nothing in the duty to make reasonable adjustments requires a service provider to take steps "which would fundamentally alter ... the nature of the service." It will be impossible to make some online services accessible to people with certain disabilities. Many online games, for example, cannot be made accessible to blind users because to do so would fundamentally alter the nature of the game. Providing such games to the public would not breach the Equality Act.

A web product that is not accessible does not automatically breach the Equality Act. If the provider of a web product offers the same service through another channel, and if the standard of service is the same, then the service provider is unlikely to breach the Equality Act.

The EHRC's Services Code lists factors which might be taken into account when considering what is reasonable:

- whether taking any particular steps would be effective in overcoming the substantial disadvantage that disabled people face in accessing the services in question;
- the extent to which it is practicable for the service provider to take the steps;
- the financial and other costs of making the adjustment;
- the extent of any disruption which taking the steps would cause;
- the extent of the service provider's financial and other resources;
- the amount of any resources already spent on making adjustments; and
- the availability of financial or other assistance.

The Services Code recommends reviewing regularly whether services are accessible to disabled people. "Carry out and act on the results of an access audit carried out by a suitably qualified person," it states. It also says that service providers should review regularly the effectiveness of reasonable adjustments. It follows that service providers ought to commission periodic testing by users with disabilities to ensure that web products are and remain accessible.

C.3.2 The DDA's application to web products

The DDA includes "access to and use of information services" among a list of examples of services to which it applies. Information services will include web content. Consequently, in most cases, web content that is provided to members of the public has to be accessible and usable to comply with the DDA.

The Equality Commission for Northern Ireland's Code of Practice on Rights of Access, Goods, Facilities, Services and Premises includes the following example: "An airline company provides a flight reservation and booking service to the public on its website. This is a provision of a service and is subject to the Act."

The Code is influential: courts and tribunals have to take into account any part of the Code that appears to them to be relevant to questions arising in proceedings.

Some web content that is not accessible to disabled users will be lawful under the DDA. An organization can refuse to make a service available to disabled people if the organization would otherwise be unable to provide the service to members of the public. Similarly, the organization can provide disabled users with a lower standard of service or on different terms if such treatment is necessary in order for the organization to provide the service to the disabled person or to other members of the public. For example, it would be impossible to make some online games accessible to blind users. Providing such a game to the public does not breach the DDA.

A web product that is not accessible does not automatically breach the DDA. If the provider of a web product offers the same service through another channel, and if the standard of service is the same, then the service provider is unlikely to breach the DDA.

C.3.3 Legal aspects of making web products accessible on different platforms

Web products are increasingly accessed on devices other than desktop computers. For example, users might wish to access web products via mobile phones, internet tablets, games consoles or televisions (see 6.9 for discussion of these delivery platforms). However, some web products might not be accessible to disabled users of these devices.

Making a web product accessible across multiple platforms can be difficult and consequently expensive. For example, a web product might be optimized for the accessibility features of one manufacturer's mobile phone but it might be incompatible with the accessibility features of another manufacturer's mobile phone.

If a web product is not accessible to anyone on a particular platform, there is unlikely to be any legal duty to make it accessible to disabled users of that platform.

If a web product has not been optimized for a particular platform but happens to be accessible only to non-disabled users of that platform, there might be a case for arguing that it needs to be accessible to disabled users as well. The test will be whether such an adjustment is reasonable. Factors that might be taken into account when considering what is a reasonable adjustment are listed at C.3.1.

If a web product has been optimized for a particular platform, there is likely to be a stronger case for arguing that it needs to be accessible to disabled users of that platform.

Consequently, an organization needs to consider the platforms that can be used to access its web products. It needs to consider for each platform:

- the importance or popularity of that platform for non-disabled users;
- whether that platform is used or is likely to be used by disabled people;
- whether it is possible to make adjustments to the web product to make it accessible to disabled users of that platform; and
- where it is possible to make such adjustments, whether it is reasonable to do so.

C.4 The law's application to intranets

Other provisions of the Equality Act and the DDA exist to protect disabled employees, as opposed to members of the public. If an organization has an intranet that provides information to help all staff perform their normal duties, such as contact details or office forms and manuals, that intranet ought to be accessible to any disabled member of staff, unless the information is made available to such staff by other means.

If the intranet is not accessible to a disabled member of staff and the information is not provided to that person in another format that is accessible, that person could argue before an employment tribunal that he or she has been discriminated against.

The Equality Commission for Northern Ireland's Disability Code of Practice (Employment and Occupation) [12] contains the following example:

"An organisation has a policy to ensure that all employees are kept informed about the organisation's activities through an intranet site. The policy says that the intranet site should be accessible to all employees, including those who use access software (such as synthetic speech output) because of their disabilities."

Disabled school pupils and students at institutions of higher education are also protected across the UK. Intranets made available to pupils and students ought to be accessible to any disabled pupil or student, unless the information is made available by other means.

C.5 The law's application to software

C.5.1 Duties of suppliers of software

The application of the Equality Act and the DDA to software is uncertain but providers are safer to assume that the legislation does apply to software than to assume that it does not. The main reason for the uncertainty is that software is sometimes categorized as a service and sometimes as goods. The Equality Act and the DDA apply to the provision of services only.

As a consequence, the legislation is more likely to cover some types of software than others. It is likely to cover software, and require it to be accessible, where it is provided as a download for installation and running on a user's computer or as an "app" provided as a download for installation and running on a mobile device.

The legislation is also likely to cover software that is hosted remotely and provided to users across the internet (an approach sometimes known as "Software as a Service" or "Cloud Computing"). When software is sold only on a tangible storage device, such as a Compact Disc (CD), it is less likely that the legislation will apply.

The distinction might seem illogical but it derives from a small body of case law. The case of *St Albans District Council v ICL* suggests that software contained on a tangible medium needs to be classed as "goods" otherwise it will be a "service". The Equality Act and the DDA apply to services but not to goods. However, the matter has never been resolved conclusively and only a court can decide whether the legislation will apply in particular circumstances.

The hardware on which the software runs – such as a computer or a mobile phone – is unlikely to be covered by the Equality Act because it is likely to be classed as goods and not as a service. However, the organization may have obligations where the hardware is provided as part of a contract for services. For example, where a choice of mobile phone is provided as part of a contract for services, that choice ought to include at least one model that is accessible to disabled customers.

The accessibility of hardware is also an important consideration for employers and education providers who have duties under the Equality Act and the DDA to their respective employees and pupils or students.

C.5.2 Duties of customers of software

Some customers are under a duty to choose accessible software (and equipment). If a disabled member of staff needs to use software to perform his or her duties, the employer has to choose software that is accessible. The Equality Act and, in Northern Ireland, the Special Educational Needs and Disability (Northern Ireland) Order, place similar duties on education providers. The Equality Act, the DDA and separate public procurement laws place such duties on public sector organizations across the UK. These duties are discussed further at C.6.2.

C.6 Who owes duties under the law?

C.6.1 Services to the public

Where an organization is established in Great Britain, the Equality Act applies to the provision of services in any state of the European Economic Area (EEA), which comprises the 27 member states of the European Union (EU) and Iceland, Liechtenstein and Norway. An action might be brought in the UK courts against the provider of a web product whether or not the individual affected is in the UK, so long as they are in an EEA state.

Where the provider is established outside Great Britain, the Equality Act does not apply to the provider's web products, even if they are available in Great Britain.

A company can have a presence in Great Britain without being "established" there. In most cases, "established" companies will be those registered with Companies House in Great Britain (though they might be owned by foreign entities).

Where an organization is established in Northern Ireland, the DDA will apply to its provision of services. The DDA says less about jurisdiction than the Equality Act, leaving the issue to be resolved by the courts. It might be possible for a disabled person in Northern Ireland to rely on the DDA in a claim against an organization established elsewhere if it provides services to members of the public in Northern Ireland.

It is possible that more than one party will share responsibilities under the Equality Act and the DDA. For example, if a travel firm uses a third party's booking interface on its web product and that booking interface is not accessible to disabled users then either or both parties could be challenged under the legislation. However, the supplier of the booking interface is likely to carry a lower risk than the travel firm in these circumstances.

A web developer might also carry responsibility, though again it is a less likely target than its client. The Equality Act says that a person "must not knowingly help" another to do anything which contravenes the Act. There is also a duty on the client not to instruct anyone to do anything which contravenes the Equality Act.

Similarly, the DDA states: "A person who knowingly aids another person to do an act made unlawful by this Act is to be treated for the purposes of this Act as himself doing the same kind of unlawful act."

C.6.2 Other services

Organizations face additional duties to disabled members of staff and disabled job applicants. Consequently, the Equality Act and the DDA require most intranets to be accessible (see C.4) and the employer is under a duty to choose accessible software if disabled members of staff need to use that software to perform their duties (see C.5).

The Equality Act places similar duties on schools and institutes of higher education.

Public sector bodies (including schools and universities, as well as, for example, central and local government) are also subject to equality duties not shared by private sector organizations.

Under the Equality Act, the general equality duty provides that a public authority or a person carrying out a public function has to have due regard to the need to, among other things, “eliminate discrimination” and “advance equality of opportunity between persons who share a relevant protected characteristic and persons who do not share it.”

Bodies subject to the public sector equality duty will be expected to have due regard to the need to carry out “positive action” measures. It is always lawful for a service provider to treat a disabled person more favourably than they treat a non-disabled person.

In Northern Ireland, public authorities have since 2007 been required, when carrying out their functions, to have due regard to the need to promote positive attitudes towards people with disabilities and to encourage the participation of people with disabilities in public life.

Accessible information technology (IT) is also required in public procurement contracts. The Public Contracts Regulations 2006 [13], which apply in England, Wales and Northern Ireland, state: “When laying down technical specifications ... a contracting authority shall, wherever possible, take into account accessibility criteria for disabled persons or the suitability of the design for all users.” The same provision is found in the Public Contracts (Scotland) Regulations 2006 [14].

C.7 To whom the duty is owed

The duty in the Equality Act and the DDA that affects the provision of web products to the public is a duty owed to disabled people generally. The EHRC’s Services Code and the Equality Commission for Northern Ireland’s Code state that it is “not simply a duty that is weighed up in relation to each individual disabled person who wants access to a service provider’s services or who is affected by the exercise of a public function.” In contrast, the employer’s duty in the Equality Act and the DDA that affects intranets is a duty owed to the individual disabled people with whom the employer has dealings. So an employer is required to consider the particular needs of any disabled member of staff.

C.8 Claims of compliance with the law

C.8.1 General principles

There is a misconception that conforming to a particular Level of WCAG will make web products legally compliant. It is true that a web product conforming to Level AA of WCAG is unlikely to be the subject of a legal challenge; but neither the Equality Act nor the DDA makes any reference to WCAG or any other web guidelines.

Only a court can decide whether a web product complies with the legislation or not. The key question for a court is likely to be whether disabled users can access and use the web product without unreasonable difficulty. Time, inconvenience and effort might be relevant factors in gauging whether there is unreasonable difficulty.

The best evidence of a compliant web product is likely to be evidence of successful user testing that involved disabled participants. Frequent testing and the involvement of participants with different disability profiles will strengthen that evidence.

Evidence that a web product conforms to WCAG Level A or higher will be useful and could be influential – but it is likely to be less influential before a court or tribunal than evidence of successful user testing.

Courts are unlikely to expect every organization to put all web products they control through regular testing by a range of participants. A court is likely to expect an investment in testing that is in proportion to the overall investment in web products.

When a small business commissions a web product, a court might be satisfied by evidence of successful testing by one blind user. Research commissioned by the EHRC's predecessor, the Disability Rights Commission (2004), suggests that blind users tend to experience more difficulties in using web products than other impairment groups. A court is likely to expect more extensive and varied testing by a large organization.

Organizations and developers ought to be pragmatic about testing. For example, if an organization or a developer is launching a site that copies the design of an existing site, it might not be necessary to test the new site to the same extent as the original.

C.8.2 Compliance with “Section 508”

Some organizations cite compliance with “Section 508” as evidence of legal compliance.

Section 508 is a provision of the Rehabilitation Act [15], a law that applies in the United States but not in the UK. It mandates accessibility in the Federal government’s procurement of IT, including web products, and sets certain minimum technical standards.

While the Section 508 standards are in the process of being updated at the time of writing (see: <http://www.access-board.gov/508.htm>) the current standards are based on WCAG 1.0 Level A and can therefore be considered to be a base level of accessibility. Products that only comply with this level are likely to have accessibility issues that will impact the usability of the product one or more groups of users.

Organizations ought therefore not rely solely upon evidence of compliance with Section 508 as an indicator of the accessibility of the product and need to conduct testing as stipulated in Clause 6.

C.9 When to make adjustments to web products

Organizations ought not to wait until a complaint is received or until a scheduled redesign before making their web products accessible. The duty to make reasonable adjustments is an anticipatory duty. Therefore, service providers are required to think about and take reasonable steps to overcome features that might impede persons with particular kinds of disability.

Failure to anticipate the need for an adjustment might amount to a breach of the legislation. Courts are unlikely to consider that the duty began when the Equality Act came into force because the same duty existed in the DDA, which came into force across the UK for most service providers on 1 October 1999. The Equality Act replaced the DDA except in Northern Ireland.

The duty in the legislation is also a continuing one: what was originally a reasonable step to take might no longer be sufficient.

Service providers are not required to anticipate the needs of every individual who might use their service. The EHRC’s Services Code acknowledges that “there may be situations where it is not reasonable for a service provider to anticipate a particular requirement.”

In the employment context, a duty to make reasonable adjustments has existed across the UK since 1996.

The duty of education providers to make reasonable adjustments is an anticipatory one that has been in force since 2002. Education providers have to be proactive in finding out about disabled people's requirements.

The Disability Equality Duty, which applies to the public sector, has been in force since December 2006 in Great Britain and since January 2007 in Northern Ireland.

C.10 Providing access technologies on web products

A requirement of the duty to make reasonable adjustments under the Equality Act and the DDA is to consider the provision of an auxiliary aid.

The Equality Act states that, "where a disabled person would, but for the provision of an auxiliary aid, be put at a substantial disadvantage in relation to a relevant matter in comparison with persons who are not disabled, [the service provider is required] to take such steps as it is reasonable to have to take to provide the auxiliary aid." The DDA contains a similar provision.

The EHRC's Services Code notes: "Nothing in the Act requires a service provider to provide an auxiliary aid or service to be used for personal purposes unconnected to the services being provided or to be taken away by the disabled person after use."

An organization does not have to supply screenreader software to a blind user of its public-facing web products (unlike an employer or education provider, which might have to provide such software and other equipment to disabled staff or students). But the organization could consider providing access technologies on its web products. For example, a button on a web product might launch an audio player that converts text into speech. This would be an auxiliary aid.

It is unlikely that there is currently a legal duty on the provider of public-facing web products to supply such technologies. The Equality Commission for Northern Ireland's Code of Practice on Rights of Access, Goods, Facilities, Services and Premises gives examples of auxiliary aids that it might be appropriate to provide for people with a visual impairment. The examples include "accessible websites" – which suggests a focus on making a web product accessible with a user's access technology.

However, an organization ought to anticipate the needs of disabled people, and these can change as technology and best practices evolve. If there is demand for such technology from disabled users generally or from a significant class of disabled users (such as children), the provision of such technology could be a reasonable adjustment under the Equality Act and the DDA. At present there is little evidence of demand for such technology among disabled users generally. It follows that website owners are unlikely to breach the Equality Act or the DDA by failing to provide such auxiliary aids at present.

C.11 Responsibility for user-generated content

It will generally be unrealistic to hold a provider liable for the accessibility of content generated by the users of a web product, albeit the site on which the content is hosted generally needs to be accessible.

Where possible and appropriate, a provider needs to offer authoring tools that are ATAG-compliant [see 7.1.1.2]. But for sites that deal with high volumes of user-generated content, it will be impossible to ensure the accessibility of each item of content without excessive cost or a fundamental change to the nature of the service. The duty in the Equality Act and the DDA to make reasonable adjustments does not require steps that would fundamentally alter the nature of the service or that would cause the operator to incur excessive expenditure.

Sometimes it will be appropriate for an organization to make user-generated content accessible. For example, an organization that hosts thousands of user-generated videos may decide to promote one or two of them on its homepage. Captioning all

videos is likely to be prohibitively expensive; but it might be reasonable to expect the organization to caption a few videos that its editors have selected for promotion on the homepage. On the other hand, if the appearance of a video on the homepage is dictated by user votes and takes place without editorial review, captioning might not be necessary to comply with the Equality Act and the DDA. Web product operators ought to encourage users to follow good accessibility practices when submitting content. For example, a photograph or video-sharing web product could offer the tools to add captions (not just tags) to content.

Where an organization uploads content to a third party web product to make that content publicly available, that organization could be held responsible for making its contribution accessible. Individuals are unlikely to bear this responsibility when they upload content for non-commercial purposes.

Annex D (informative)

Business case for making web products accessible

NOTE 1 This informative annex provides information and guidance. It is intended to be read in conjunction with Clause 1 to Clause 8 of this British Standard.

NOTE 2 While the information in this annex is intended to be useful to everyone, it is specifically aimed at those role responsible for the organization's web accessibility policy (see 4.2).

NOTE 3 Further business benefits achieved by making web content accessible are given at <http://www.w3.org/WAI/bcase/>.

To gain further information and case-studies on the business case for making web products accessible, organizations are advised to read the OneVoice "Accessible Information and Communication Technologies: Benefits to Business and Society" report at [http://www.onevoiceict.org/pdfs/Accessible ICT – Benefits to Business and Society.pdf](http://www.onevoiceict.org/pdfs/Accessible%20ICT%20-%20Benefits%20to%20Business%20and%20Society.pdf).

The report presents the business rationale behind the commitment to diversity and inclusion of some of the UK's principal employers, procurers and producers of ICTs and the commercial benefits they have reaped through investing in accessible ICTs.

The report details six key business goals for accessible and usable ICTs.

- 1) Reach new markets.
- 2) Maximize employee engagement and productivity.
- 3) Provision high quality products and services.
- 4) Improve supply chain management.
- 5) Build partner and community relations.
- 6) Minimize risk of legal action.

The report includes case studies that demonstrate how organizations from the ICT industry, business, government, the third sector and academia have invested in achieving these goals.

In achieving these goals, each organization reveals how the investment contributes to critical success factors within the organization's performance perspectives of customers, employees and internal processes, improving business performance.

Crucially, they illustrate how the investment increases the bottom line. And further, how providing accessible ICTs contributes to a social responsibility agenda to benefit society as a whole.

The case studies are from: the BBC, the British Museum, BT, Business Link, the Department for Environment, Food and Rural Affairs (Defra), the Department for Work and Pensions (DWP), HM Revenue & Customs (HMRC), Lloyds TSB and Visual Position.

Annex E Examples of a web accessibility policy and web accessibility statement (informative)

NOTE 1 This informative annex provides information and guidance. It is intended to be read in conjunction with Clause 1 to Clause 8 of this British Standard.

NOTE 2 While the information in this annex is intended to be useful to everyone, it is specifically aimed at those responsible for the organization's web accessibility policy (see 4.2 and 4.3), and the web product's accessibility policy and statement (see 4.5 and 4.6).

COMMENTARY ON ANNEX E

In this annex, the WCAG, ATAG, and UAAG standards referred to are the latest approved version.

E.1 Example organizational web accessibility policy

<Organization Name> is committed to providing websites, intranets and online applications that are accessible to the widest possible audience. We actively work to ensure that our websites are accessible and usable by people of all abilities.

To support this goal, a suite of policies has been created. This policy framework aims to provide information most relevant to different areas of the organization. Policies within the framework include:

- the organization's web procurement policy;
- the organization's web technology policy;
- <note other policies here>.

Policy Intention

The intention of this policy is to identify clear accessibility principles that all <Organization Name> websites should follow. For the purpose of this policy, the term "website" includes:

- All external websites, including extranets;
- All internal websites, including intranets;
- All online applications.

Policy Principles

The principles of this policy form a set of requirements that <Organization Name> will uphold for all websites. The principles should be fulfilled according to the policy timetable.

- To meet responsibilities under the Equality Act (2010)/ Disability Discrimination Act (1995);
- To meet level <A/AA/AAA> of the <Web Content Accessibility Guidelines (WCAG 2.0)> as standard;
- To use the <Authoring Tool Accessibility Guidelines (ATAG)> as part of the technology procurement process;
- To promote the <User Agent Accessibility Guidelines (UAAG)> through the production of <WCAG> compliant websites;
- To provide appropriate channels of communication for feedback about accessibility, both from within the organization and from the general public.

Policy Timetable

A clear timetable for meeting the principles of the policy has been defined. The timetable reflects the different approaches needed for new and existing websites.

- For all websites created after <Insert Date> the policy will be effective immediately;
- For all existing websites, a programme to update the websites to align with the policy will be put in place starting from <Insert Date>.

E.2 Example web product accessibility policy

- The purpose of the product (see 6.1).
 - <Organization Name> is embarking on a project to create a new website to enable more people to access its existing “How to get online and get the best out of the Internet” videos, which are currently only available on DVDs it gives away free to libraries.
 - The purpose of the product is to enable more people to benefit from the information and training in its videos, and enable users to easily suggest new features for future versions of the videos.
 - The organization is a charity so the product’s secondary purposes are:
 - to make more people aware of the charity by putting the videos online, rather than make any money; and
 - to allow the charity to determine whether it could stop producing costly DVD runs and still reach the same number of people purely through the online versions of the videos.
- The target audiences for the product (see 6.2).
 - The target audience for the product is anyone who wants to learn more about getting online or getting the best out of the Internet.
 - This is a very broad target audience, so the organization has done research to find out who is most likely to want to the information in its videos.
 - It has used this to split its audiences down into the following.
 - Primary target audiences, who are likely to gain most from the information, including:
 - older people (60+) who are either: going through the process of getting online, or are in the first few months after getting online; and
 - people who are disabled or have literacy difficulties who are either: going through the process of getting online, or are in the first few months after getting online.
 - Secondary target audiences, including:
 - teenagers/adults who need to review the videos to recommend them to their grandparents/parents to help them get online; and
 - “get online” course tutors in libraries who need to review the videos to consider using them in their courses.
- Research on the target audiences’ needs (see 6.3).
 - A brief search of online information about the specific needs of older and disabled people has indicated the following needs as key issues for the product.
 - Deaf and hard of hearing people will need the videos to be subtitled.
 - Blind people will need the videos to be audio described.

- Almost all their users will need any navigation to be as simple as possible, the design needs to include images to back-up text, all text has to be resizable, and the colours used on the site need to be changeable due to the conflicting needs of people with vision impairments and those with visual stress.
- The platform and technology preferences and restrictions of the product's target audiences (see 6.4).
 - A brief search of online information about the technology preference and restrictions of the target audiences has indicated the following.
 - Many older people are using older "hand me down" computers from their children/grandchildren to help make getting online as cheap as possible.
 - Many disabled people who are new to the internet do not already have any assistive technologies or know how to change the settings in their browsers, so wherever reasonable the product needs to provide these features itself.
- A decision on the relationship the product needs to have with its target audiences (see 6.5).
 - The purpose of the product is to give general information to as many people as possible. It does not intend to customize this information for its users. But it will allow users to choose accessibility preferences for accessing it.
 - It will not use a login system, but will store preferences in a cookie on the user's computer.
- The user goals and tasks the product needs to provide (see 6.6).
 - The product's core user goals are to provide users with a simple way of:
 - learning what different types of equipment and services they need to get online (e.g. computer, phone line or cable, contract with internet service provider) and their different costs;
 - learn how to initially set up their computer and get onto the internet;
 - learn what a browser is;
 - learn about any browser settings or assistive technologies that they might need to get the best out of their computer;
 - learn about the common conventions used to find, navigate around, and interact with websites; and
 - learn about some of the types of websites they can now use to enrich their lives (e.g. other learning sites, price comparison websites, entertainment sites).
- The degree of user-experience the product will aim to provide for each combination of user group and user goal (see 6.7).
 - The product will aim to provide people with a satisfying user-experience for each of its user goals so people will enjoy learning and recommend the site to their friends – this is the level of production values in the videos already, and the organization pride themselves on this.
- The accessibility production approach to be used (see 6.8).
 - The approach will be a combination of inclusive and personalized. The organization will make sure the product uses inclusive design and works with assistive technologies. But it will also provide product adaptation through a "style-switcher" which allows users to change fonts between three different sizes, and change text and background colours between four different

combinations. And it will provide subtitled and audio-described alternative versions of its videos.

- The delivery platforms the product will support (see **6.9**).
 - While the organization appreciates that its website might be viewed on mobile phones, and would like it to be easily usable on IPTVs when they are more widely used, it will use the minimal degree of support for these other platforms to minimize costs for this project. It will review this decision annually after launch to see if the extra investment of optimizing for IPTV or mobile is now worth it.
- The target browsers, operating systems (OS) and assistive technologies the product will support (see **6.10**).
 - From its research on technology preferences and restrictions, the organization has decided that:
 - the product needs to work on older browsers as well as new ones, as older people are using older computers – they have reviewed the BBC's latest browser support standards, and will support the older browsers detailed in it;
 - the product will concentrate on providing and testing its own "style-switcher" rather than testing against browser settings; and
 - the product will aim to support cheap/free screenreaders as well as expensive ones as many older people cannot afford the newest, best screenreaders.
- Choose whether to create or procure the web product in-house or contract out externally (see **6.11**).
 - The organization has no web production skills in-house, nor has it the need for these skills permanently. So it has decided to contract the production out to an external web design agency, including the product's accessibility policy (and any relevant sections from its organization web accessibility policy) in its ITT.
 - The organization requires the agency to detail all further decisions it makes which impact accessibility in updates to the product's accessibility policy.
 - The organization does not specify whether the design agency they choose needs to create the web product from scratch or use a combination of components. Their overriding requirement is that the agency proves the resulting product they deliver meets the requirements in its accessibility policy.
- Define the web technologies to be used in the web product (see **6.12**).
 - The organization has no skills in this area, so requires the agency to confirm and document that the technologies it uses will enable it to produce a product which meets the requirements in its accessibility policy in the most efficient way, both for launch and for any maintenance required post-launch.
- Use web guidelines to direct accessible web production (see **6.13**).
 - The organization requires the agency to confirm and document which guidelines it uses to produce the product, and how these enable it to produce a product which meets the requirements in its accessibility policy.
- Assure the web product's accessibility through production (see **6.14**).
 - The organization requires the agency to create an accessibility test plan for the product (see **6.14**) and document the results of implementing that plan to prove that the product the requirements in its accessibility policy.
 - Where the agency has difficulties providing the satisfying user-experience to all its target users for all its core user goals, the organization requires the agency to flag these difficulties early so it can discuss these with the agency

and make the decision whether to accept and document any downgrade in this degree of user-experience. If it accepts this it will make plans for how to explain this to users in the short-term, and plan for any fixes in the longer-term.

- An example of such a difficulty might be the agency not knowing how to include audio described versions of the videos, as audio description is not on the DVDs already, and the agency is not skilled in audio description.
- Communicate the web product's accessibility decisions at launch (see 6.15).
 - The organization creates the accessibility statement for the product with help from the agency on any technical details, and includes it as an "Accessibility" link on every page of the product at launch.
- Plan to assure accessibility in all post-launch updates to the product (see 6.16).
 - The organization adds responsibility for reviewing any feedback from the web product to the job-description of one of its staff. It negotiates with the agency a support contract for fixes any bugs found in the product over time, and makes plans to review the web product for updates every half year.
- Risk register for the product.
 - At its point of launch, the product's accessibility limitations are as follows.
 - It does not provide audio description for its videos, so blind users might find some videos difficult to understand if any information in the video is provided solely in visual form and not explained in the commentary.
 - It does not provide totally customisable text and background colours, so could exclude the small number of users who might not be able to find a usable colour combination in the 4 included in the "style switcher".

E.3 Example web product accessibility statement

<Organization Name> is committed to providing a website that is accessible to the widest possible audience. We actively work to ensure that this website is accessible and usable by people of all abilities.

How to get the most accessible experience from this website

Our website can be viewed on a range of different screen sizes and the size of text can be changed to suit different people. We have also included a search facility, sitemap and glossary, to help people find information more easily.

Changing Settings

Using your web browser, you can change the size of text on this website. You can also make other helpful changes in your browser, as well as within your computer generally.

To find out what else you can do, visit My Web My Way (<http://www.bbc.co.uk/accessibility/>).

Website Tools

This website also provides some additional tools to help you personalize it to your preferences. A "style switcher" is available on every web page. It allows you to change the basic layout, colour contrast and text size of the web content, all in one go. It is also possible to listen to this web content being spoken aloud. We have enabled <Insert Technology Name>, so people can choose to listen rather than read information on the site.

Accessibility limitations

At the time of launch, this website is not known to have any limitations which will make it difficult to access for any group of users.

Contacting Us

We are always looking for ways to help people get the best experience from this website. If there is information you think should be included on this page, or if you experience any problem accessing the site then please <contact us>.

Please note: for advice on what information to include when you contact us, we recommending you read "Contacting Organizations about Inaccessible Websites" (<http://www.w3.org/WAI/users/inaccessible>).

Accessibility guidelines

All pages of this website conform to level <A/AA/AAA> of the Web Content Accessibility Guidelines 2.0. These guidelines are the internationally recognized benchmark for building accessible websites.

The Web Content Accessibility Guidelines explain how to make websites more accessible for people with disabilities. Conformity to these guidelines also makes websites more user friendly for all people.

Web standards and technologies

This website has been built to conform to W3C standards for HTML and CSS. These technologies are relied upon throughout the site. The site displays correctly in all popular web browsers, and degrades gracefully in older browsers.

In addition this website uses <JavaScript/Flash/PDF/Other Technology>. These technologies are not relied upon and the website works perfectly well without them. Where <JavaScript/Flash/PDF/Other Technology> have been used, they meet the same high levels of accessibility as the rest of the site.

Conformance date

This accessibility statement was issued on <Date>.

Annex F (informative)

Allocation of responsibilities

NOTE 1 This informative annex provides information and guidance. It is intended to be read in conjunction with Clause 1 to Clause 8 of this British Standard.

NOTE 2 While the information in this annex is intended to be useful to everyone, it is specifically aimed at those responsible for delegating web accessibility responsibilities across the different departments/functions of the organization (see 4.2).

COMMENTARY ON ANNEX F

The following are examples of activities (posed as questions) that might be applicable in larger organizations to support the development of an accessibility policy – this is not an exhaustive list.

These activities might relate to internal organizational processes including training and development programmes and staff awareness programmes.

F.1 Web production teams

- Web Product Owners: have you been made aware of and documented any known accessibility issues with your web product?
- Project Managers: have you allocated sufficient money and time to address accessibility-related activities through the project lifecycle?
- Testers: have you developed and executed test cases and documented results addressing accessibility by persons with disabilities and older people?

F.2 Governance

- IT and Business Executives: are you or someone in your team aware of which web products do not conform with requirements on accessibility and thus pose a risk to the organization?

F.3 Internal communications

- Board and Executive Workshops: have you informed the board of the issues to enable them to make a judgment on the Organizational Policy statements?
- Management Programme: have you initiated a programme of events/information to inform your organization's managers of the implications of the Equality Act and DDA?
- Staff Programme: have you initiated a programme of events/information to inform each individual in your organization of the personal implications for them of the law in relation to disabilities and/or difficulties like dyslexia? For example, their right to a reasonable adjustment to their working practices, or the provision of auxiliary aids or services.

F.4 External marketing and communication

- Marketing and Communications: have you integrated accessibility into market segmentation and marketing communications development processes? Do you provide and openly advertise the availability of alternative accessible communication? For example, electronic alternatives to paper-based communication.
- Customer needs: have you assessed the size, scope, nature, perceptions and needs of the different segments of the audience, including disabled users and older people?
- Customers/community/shareholders awareness: do your stakeholders know where and how to access your marketing and communication in a way that meets their needs?
- Communication: do you provide alternative accessible communication? For example, electronic alternatives to paper based communication such as leaflets, guides and other small print documents?

F.5 Training

- On-going training: do you have on-going training for all of your specialists and managers/supervisors so they are aware of legal developments, and new tools and techniques available to support disabled and older people?

F.6 Procurement

- Procurement: have you integrated accessibility requirements into your procurement processes so that deliverables from your suppliers will be accessible?
- Procurement: have you assured that language addressing accessibility and the contractor's commitment to deliver on accessibility within a reasonable timeframe is in the contract?
- Procurement: is someone who understands accessibility within the organization actively involved in reviewing and ranking completed invitations to tender?

F.7 HR

- HR recruitment and retention practices: do you have established practices that individuals are made aware of throughout their employment for declaring disabilities or difficulties in communication and the use of any software and web content that they are required to use in the course of their employment?
- Individual support: do individuals have access to support? For example, coaching/hardware/software/quiet area to work?

Annex G
(informative)

The accessibility challenges of different types of web product

NOTE 1 This informative annex provides information and guidance. It is intended to be read in conjunction with Clause 1 to Clause 8 of this British Standard.

NOTE 2 While the information in this annex is intended to be useful to everyone, it is specifically aimed at those responsible for defining the purpose of a web product (see 6.1).

COMMENTARY ON ANNEX G

This Annex details the accessibility challenges of certain types of common web products, especially Web 2.0 sites.

G.1 Social networking sites and other sites allowing users to generate their own web content (e.g. blogs)

Special care needs to be taken by the owners of sites that allow their users to create and share their own content, like any web-based content creation system (e.g. intranet builders or content production systems, see 7.1.1.2) in the following ways.

- The content creation system, like any web-based creation system, needs to be accessible, to allow disabled people to create content and participate in the community.
- The content creation system needs to also enable all people to create accessible content, adhering to ATAG checkpoints as far as possible. For example, it needs to enable users to add alternative text for images, or subtitles for videos. Accessible content creation needs to be, as far as possible, enabled by default, supporting seamless accessible authoring, rather than requiring authors to seek specific functionality in order to add necessary accessibility features to the content they create.

It will generally be unrealistic to hold a site owner liable for the accessibility of content generated by users (see C.11) and site owners are unlikely to require users to ensure the accessibility of content they contribute. However, the following is good practice.

- User-generated content/social networking sites could evangelize the reasons why accessibility is so important and how their users can make their content accessible.
- Where it is unlikely that users will make their content accessible, due to time/cost (for example users providing subtitles or audio description for video uploads), site owners need to consider whether they could provide such a service. This could be for popular content on the site, as part of their site content moderation procedures.

G.2 Video-based sites

Special care needs to be taken by the owners of video-based sites to consider how their video content is to be made accessible for people with sensory impairments.

Unfortunately, no assistive technologies can make video accessible to all people. It is up to the site owner to consider whether they will enrich their video content with subtitles or transcripts for hearing-impaired people, audio-description for visually impaired people, or signing for deaf people.

NOTE People viewing video in noisy offices many also benefit from subtitles.

If the site owner considers such measures to be too expensive to implement on a site, the site's accessibility statement needs to include their justification for the reasonableness of this decision.

G.3 Software as a Service/Cloud Computing sites including dynamically-updated pages

Special care needs to be taken in the coding of sites that include pages which dynamically update (especially Software as a Service (SaaS) sites which replicate the functionality of shrink-wrapped software within a web browser). The dynamic updates and complex interactions on such sites' pages require the sites to be encoded in such a way that screenreaders and other assistive technologies can cope with the challenge of making such interactions accessible, following the W3C's WAI-ARIA standards (see 7.1.1.4).

G.4 Online games and three-dimensional (3D) exploratory interfaces

It is difficult to make games (especially advanced massively-multiplayer online games) accessible, due to:

- their highly visual nature, which provides challenges for people with vision impairments or who are blind;
- their highly interactive nature, which provides challenges for people with motor difficulties; and
- the finely-tuned level of challenge that differentiates satisfying gameplays from those that are too easy or too hard to be satisfying. This provides challenges for people with cognitive difficulties or learning disabilities.

However, games can be made more accessible to disabled and older people with the inclusion of preferences such as:

- the inclusion of captions for all game-information which is usually conveyed through sound;
- the inclusion of mechanisms to map game controls to simple control mechanisms (see <http://www.oneswitch.org> for ideas); and
- the inclusion of challenges which require lower levels of cognitive capability to master.

Owners of games sites need to consider the inclusion of such preferences into their games to increase their accessibility.

Useful inspiration can be found at:

- <http://www.game-accessibility.com/>: a site detailing game accessibility guidelines, case-studies, example games, and access to a community of people interested in game accessibility; and
- <http://www.audiogames.net/>: a site detailing games based only on sound, including: an archive of audiogames, resources for the creation of audiogames, and access to a community of people who create and play audiogames.

G.5 Learning platforms

Education is a broad area with diverse sectors and web products and related technology that might be used in different ways in each sector. However, in general, web products are often used to provide anytime, anywhere access to:

- educational content and its management;
- curriculum mapping and planning;
- learner engagement and administration; and
- communication and collaboration tools and services.

While this standard will refer to aggregations of tools like this as Learning Platforms, they may be known by different names in different education sectors:

- they are commonly termed as “Learning Platforms” in the schools sector.
- they are often referred to as Learning Management Systems (LMSs), Virtual Learning Environments (VLEs) or Managed Learning Environments (MLEs) in Higher and Further education.
- some systems with a learner focus and direct learner engagement are known as Personal Learning Environments (PLEs) along with e-portfolios.

It is common to refer to a Learning Platform as if it were a single entity; however, a Learning Platform is often not a single product but rather a collection of interoperable systems or modules, possibly from different suppliers.

Delivery of learning is best achieved by an individual approach and the impact of accessibility challenges can be critical for every learner. Mitigation of these challenges can be achieved by a personalized approach to accessibility that meets a learner’s specific requirements.

Organizations commissioning learning platform services need to:

- create a statement of requirements based on clearly identified educational needs including current and anticipated accessibility needs and ensure that this statement of requirements calls for a sufficiently diverse range of alternative modes of delivery to be made available, so teachers are not put in a position where they cannot meet their obligations to learners under the Equality Act;
- ensure that, while each component of the Learning Platform they procure or create may perform discrete functions, they collectively deliver the requirements.
 - Where Learning Platforms or Learning Content is being selected for purchase or use, those systems and content that best support the Accessibility Guidelines in Clause 6 need to be chosen.
 - Where Learning Platforms are being selected for purchase or use, those that best support individual approaches to accessibility need to be chosen. Whilst recognizing that technical approaches to individualized accessibility are not yet mature, where possible organizations are recommended to select tools that harmonize with or adopt the work described in Annex K.

Suppliers or developers of Learning Platforms, associated tools and technologies, and learning content need to ensure that their products enable institutions to meet their obligations to all learners, by:

- following the best available Accessibility Guidelines as detailed in Clause 6; and
- adopting technologies and practices that support harmonization with or adoption of the work described in Annex K.

Annex H **How disabled and older people experience web products**

NOTE 1 This informative annex provides information and guidance. It is intended to be read in conjunction with Clause 1 to Clause 8 of this British Standard.

NOTE 2 While the information in this annex is intended to be useful to everyone, it is specifically aimed at those responsible for analysing the needs of the target audiences for the web product (see 6.3).

H.1 Introduction

H.1.1 Two kinds of assistance for disabled or older people's use of the web

Some disabled or older people are able to enjoy the full web experience despite their impairments without any additional assistance or accommodation.

Other disabled or older people who experience mild to moderate impairments may need to change some of the accessibility settings of their operating system or web browser in order to access and use web products. This could be to alter font sizes or colours to suit their individual needs in the browser, or to use their operating system accessibility settings to control the size of the mouse pointer.

NOTE 1 The BBC and disability and technology charity AbilityNet have produced a website to inform disabled and older people of changes they can make to their operating system or browser to optimize accessibility:
[<http://www.bbc.co.uk/accessibility/>].

NOTE 2 Microsoft publishes detailed information on changes that can be made to the Windows operating system: [<http://www.microsoft.com/enable/>].

NOTE 3 Apple publishes detailed information on changes that can be made to the Mac OS: [<http://www.apple.com/accessibility/>].

NOTE 4 Detailed information on changes that can be made to Linux can be found at: [<http://larswiki.atrc.utoronto.ca/>] [<http://accessibility.kde.org/>] [<http://developer.gnome.org/projects/gap/>].

Other disabled or older people can only access and use web products with the aid of assistive technology.

H.1.2 Disabled or older people can have more than one impairment

It is important to understand that many disabled or older people have more than one impairment.

For example, these scenarios could all relate to one person.

- a) "I have severe dyslexia. I need text read out to me, especially when I am filling in forms online, so I can check that the information I have put in is correct."
- b) "I have visual stress and have difficulty reading web pages as they can look to me like "rivers of text". Low contrast between text and background colours improves the legibility of text by 50% for me."
- c) "I have ADHD (Attention Deficit Hyperactivity Disorder). I am easily distracted by pictures, moving images and diagrams. Clear, uncluttered pages of information help me to concentrate."
- d) "My eyesight is deteriorating. I need to wear my reading glasses and to have bigger text size to comfortably see the content on the screen. My co-ordination is not what it used to be and the mouse can sometimes be awkward to use."

H.1.3 Disabled or older people may not be aware of, or be able to afford, the assistance they need

It is important to understand that many disabled or older people:

- may not be aware of the accessibility settings or assistive technologies that are available to help them access and use web products; and
- may not be able to afford the assistive technologies they need at home, even if they have them at their work (as their employer provides them, usually through "Access to Work").

H.1.4 How to promote understanding to production staff

It is useful for all staff who are involved in the production of web products to familiarize themselves with the different assistive technologies and strategies that disabled or older people might use to access and use web products. They need to develop an understanding of the diverse access needs of people with different, complex and combined impairments.

The best way of gaining this understanding is by watching disabled people using web products to observe the strategies or assistive technologies they use.

NOTE Further information is available from:

- My Web, My Way (<http://www.bbc.co.uk/accessibility/>).
- AbilityNet (<http://www.abilitynet.org.uk/>).
- Shaw Trust (<http://www.shaw-trust.org.uk/>).

H.2 Disabled people: needs and technologies

NOTE 1 The following subclauses contain examples of the needs and technologies used by disabled people.

NOTE 2 Further information is available from:

- W3C guidance on "How people with disabilities use the web" (<http://www.w3.org/WAI/intro/people-use-web.php>).
- ISO/IEC JTC1 Special Working Group on Accessibility: ISO/IEC TR 29138-1 (<http://www.jtc1access.org/TR29138.htm>) which is a very extensive summary of technical user needs for Information and Communications Technology.

H.2.1 Blind and partially sighted people

H.2.1.1 Needs

Blind and partially sighted people can have a very wide range of eye conditions leading to a very wide range of different needs. Their condition may vary from day to day and even during the day.

- Colour blindness: many colour blind people cannot read certain colour combinations that provide low levels of contrast. For this reason, never use colour as the sole means of conveying information.
- Considerable useful vision: everyone benefits when information is displayed using resizable fonts; many people benefit from high contrast between text and background colour, while some people are sensitive to glare and cannot tolerate bright or white backgrounds, preferring low contrast between text and background colour.

NOTE This wide range of different specific needs means that a solution which may suit one person could make a web product impossible for another to use. This is why personalization is so important, whether it is through ensuring you create web

products in such a way as to make them suitable for adaptation by browsers, or providing adaptation facilities within the web product itself.

- Some useful vision: many partially sighted people benefit when information is organized logically and without too much moving content.
- Little or no useful vision: many blind people access web content with the aid of assistive software known as “screenreaders” that voice the content of the screen out loud. Such software is dependent on WCAG-conformant code to be perceived correctly.

Non-textual information that is represented in non-verbal ways, such as actions on a video, needs to be made accessible through audio description. This describes non-verbal actions in the video or on the screen, when being aware of those actions is crucial to understanding the content.

H.2.1.2 Technology

Blind and partially sighted people might use any of a number of different techniques to help them access and use web content.

- Customizing web browser or operating system settings to:
 - increase the size of the text by browser settings or using lower screen resolution settings which have the effect of magnifying the content (and unfortunately also reduce the pixel size of the display – possibly making fixed sized dialogues too large, and wide web pages too wide); and/or
 - increase or decrease the contrast of colours by forcing the colours to their preferred ones (unfortunately this can also remove any colour coding used on web pages to convey information).
- Screen magnification software to magnify the view of the whole web page.
- Screenreader software to read the web content aloud through computer speakers or a headset, or into refreshable Braille output.

H.2.1.3 Scenario

Calum, despite limited vision, uses a computer very effectively, relying on speech output (via a screenreader) to access and use a full range of software including email and the web. He finds technology increasingly powerful in terms of accessing information and services. He often wants to access multimedia online but finds the lack of audio description frustrating as he can tell that he is not able to access all of the content on the screen.

H.2.2 Deaf and hard of hearing people

H.2.2.1 Needs

There are many causes of hearing loss and deaf and hard of hearing people have many different user profiles.

- The most prominent cause of hearing loss is age. The ageing process can cause other impairments including sight loss and decreased dexterity; it can also affect cognitive abilities.
- Hearing loss can also be a result of over-exposure to loud noise, or might be caused by head injuries, genetic defects and other medical conditions.

Most people with hearing loss use written English and often also spoken English to read and communicate. A smaller group of deaf people, often including those who have been profoundly deaf since birth, use sign language to communicate. The most commonly used sign language in the UK is British Sign Language (BSL). As BSL has a

different syntax and grammar to English, BSL users can find information in written English hard to understand.

H.2.2.2 Technology

A number of different technologies can be used to enable deaf and hard of hearing people to access web content.

- Many deaf and hard of hearing people use technologies such as email, instant messaging and real-time text to communicate over the Internet.
- Most people with hearing loss benefit from captions or subtitles for audio-visual content but they need to be easy to read with good contrast.
- Many people with hearing loss continue to use audio in whole or in part and thus benefit from good aural contrast between foreground and background sound.
- Textphone numbers do not follow the same convention as telephone numbers. Web developers need to bear this in mind when creating form fields for telephone contact information.
- Subtitles or captions are preferable to transcripts. This is because transcripts (which usually only contain the words spoken in an audio file or sound transmission) cannot always provide the full richness of content such as a radio broadcast.
- Sign language users benefit from information in sign language. This could be provided alongside spoken or written content in the form of video clips of sign language presenters/interpreters, or via avatars (animated characters which sign).

H.2.2.3 Scenario

Clare, who is deaf, says that the web has opened up another way for her to communicate. She can book holidays online, talk to friends via chat rooms and access a wealth of information she had not been able to access before. But she finds it very frustrating when there are no subtitles on video clips or when she cannot leave her textphone number as a contact detail.

H.2.3 People with learning disabilities

H.2.3.1 Needs

People with learning disabilities can have a wide range of different needs. These depend on the level or type of their learning disability, their personal preferences for how they like to access information, or any other disabilities they might have.

- While many people with learning disabilities, particularly those with complex needs, use web products with support from other people, it is possible to design web products in ways that will enable people with learning disabilities to use web products independently.
- People with learning disabilities often benefit from having information displayed in manageable pieces, with consistent and clear navigation and layout, a combination of mutually-supporting images and text, and the ability to control colour and text size.
- Many people with learning disabilities benefit from content that uses clear and easy language and images to support the text. Many sites aim to ensure text is written in "Plain English" (see: <http://www.plainenglish.co.uk/>), or might provide an "easy read" version of complicated text. The best way of making sure text is clear and easy to read is to test it with people with learning disabilities.

- People with learning disabilities might find video and audio easier to understand than text, and may benefit further if symbols, captions or transcriptions of the video and audio are additionally available.
- People with learning disabilities can be particularly sensitive to clutter or too many options being presented on a page.

More useful insights into the needs of people with learning disabilities when using websites are available from:

- <http://www.webaim.org/articles/evaluatingcognitive/>
- <http://www.inclusivenewmedia.org/blog/category/accessible-websites/top-tips/text-top-tips-aescessible-websites/>

H.2.3.2 Technology

A number of different assistive technologies and strategies can be used to enable people with learning disabilities to access web content.

- People with more complex learning disabilities, for example people with an additional physical disability, might use assistive technology to access and use web content. Examples of assistive technologies include switches, head wands or mouth sticks, larger keyboards and mouse alternatives such as joysticks.
- Many people with learning disabilities have a secondary impairment and choose to use technology specific to that need rather than technology specific to their learning disability.
- Text-to-speech software, which reads web content aloud, and symbolizing software, which converts text into a simple pictogram language, can help some people with learning disabilities to access and use web content.
- Some people with learning disabilities benefit from information displayed using:
 - sign language (for example, the Makaton signing used in BBC Something Special: <http://www.bbc.co.uk/cbeebies/somethingspecial/>);
 - symbol sets (for example, Widgit, Mayer-Johnson or Makaton: <http://www.symbolworld.org/>); or
 - pictorial communications.

Many people with learning disabilities do not use assistive technologies. This might be because their disability is not severe enough to benefit from assistive technology support. It might be because they are not aware of the availability of assistive technologies that might help them access web content. Or it might be that they choose not to use assistive technologies, or use accessibility settings in their browser or OS. It is therefore crucial that all web content and options for interaction are clear and easy to find and use.

NOTE See also, Inclusive New Media Design: <http://www.inclusivenewmedia.org>

H.2.3.3 Scenario

Jane has a learning disability, is deaf and partially sighted. It is important for her to be able to control the way content appears on the screen. She might or might know that her web browser can give her options to change how she accesses content. She might also not know that some toolbars can be downloaded to give her options. So, options on a website itself to change text size and colour could provide better access for her and make sure she does not miss out on information. She also relies heavily on consistent layout of pages across a website.

H.2.4 People with difficulties with literacy or dyslexia

H.2.4.1 Needs

People who have low literacy skills (whether because of a disability, or because English is not their first language) or who are dyslexic or have specific learning difficulties will find it difficult to read or write text, even though they may not have any other intellectual or learning disability.

- People with low literacy skills might find video and audio easier to understand than having to read text.

H.2.4.2 Technology

A number of technologies are available to assist people with literacy difficulties to access and use web content:

- Text-to-speech software can help people with literacy difficulties understand text on web pages. The most useful software enables users to easily indicate the sections of text on a web page they would like to hear spoken, uses high-quality voices and intelligent pronunciation, and highlights words on-screen as they are being read.
- Including spell and grammar checkers in web forms can help people who have difficulty writing.
- Including predictive search suggestions in search engines can also help people who have difficulty spelling the word for which they are searching.

H.2.4.3 Scenario

David is dyslexic, understands almost instinctively how to build and fix computers, but is finding it hard to get a job as a computer engineer because his reading and writing skills are the “guilty secret” he hides. It is important that job websites enable him to have job descriptions read out to him so he can find the right job to apply for. It is also important that job websites include spell-check functionality in their job-application web-forms, or enable him to create his application in a word-processor using a spell and grammar check before uploading the finished document.

H.2.5 People with cognitive impairments

H.2.5.1 Needs

The needs of people with cognitive impairments are diverse and the ways in which people perceive web content can vary depending on the nature of their condition. People with conditions including ADHD, multiple sclerosis, strokes and head injuries might all experience cognitive impairments such as difficulty concentrating, fatigue, confusion and short-term memory loss. These impairments may also fluctuate in severity and impact over time, often unpredictably.

- In any interaction that moves the user on from one screen to another (such as filling in an online form), it is important that a person with cognitive impairments can go back and forth between screens if they need to refresh their memory of what information they have already entered.
- Like people with learning disabilities, people with cognitive impairments benefit from having information displayed in more manageable pieces, with consistent navigation and clear layout, the ability to control colour and text size and a combination of mutually-supporting images and text.

H.2.5.2 Technology

People with cognitive impairments might use a number of different technologies and techniques to help them to access and use web content.

- Text-to-speech software can help people with cognitive impairments read text on web pages. The most useful software enables users to easily indicate the sections of text on a web page they would like to hear spoken, uses high-quality voices and intelligent pronunciation, and highlights words on-screen as they are being read.
- Some people with cognitive impairments will wish to change their web browser settings or operating system settings to customize the appearance of web content.

H.2.5.3 Scenario

Margo has multiple sclerosis. On a particular day she might have difficulty concentrating. If web content is not displayed in a consistent and logical manner throughout the site, Margo might take longer to find the information she needs.

H.2.6 People with physical impairments

H.2.6.1 Needs

People with conditions such as repetitive strain injury (RSI), cerebral palsy or who are quadriplegic due to a condition or accident might use alternative ways to access and use web content. For many people, impairments caused by accidents and illnesses are only temporary.

- Web content needs to be usable by people who cannot operate a computer keyboard, mouse or touch pad.
- Devices such as mobile phones can be inoperable by people who have difficulty using their fingers and hands.
- Some web features, if developed without keyboard access, such as forms, drop down menus, navigation and multimedia can cause particular difficulties for people with physical impairments.

H.2.6.2 Technology

A number of technologies are available to assist people with physical impairments to access and use web content.

- Many people with physical impairments use devices and strategies such as keyboard-only access, alternatives to the standard computer mouse (such as head pointing devices and switches), speech recognition software or eye tracking software to access and use web content.
- People with physical impairments will often use a combination of devices and strategies (for example, someone with RSI might use a combination of technologies, such as keyboard but no mouse and speech recognition software).

H.2.6.3 Scenario

David is paralysed from the neck down and ventilated. He uses a headset and an on-screen keyboard to use his computer. The computer and the web are his primary communication tools. These enable him to access news and sport information. He also uses the web to interact with his local community through email, forums and instant messaging.

H.3 Older people: needs and technologies

H.3.1 Needs

While often treated as a specific group with similar needs, older people represent an extremely heterogeneous group of web users, with much diversity in:

- prior experience of, and attitudes towards, technology use,
- sensory, physical and cognitive capabilities,
- socio-economic status.

Each of these factors can influence the success with which an older person can adopt and use the web as an information and communication medium. What is apparent from the literature is that age can not be seen as an indication of a person's willingness to use technology – older people are not necessarily technophobic per se. However they may require greater incentives to use technology than those who are younger, and may be less confident in their own abilities to use a computer, which can negatively impact their willingness to use technology.

More useful insights into the needs of older people in using websites are available from:

- W3C-WAI's literature review on the needs of older people in using websites (<http://www.w3.org/WAI/intro/wai-age-literature>) and additional resources (<http://www.w3.org/WAI/older-users/>).
- CEN/CENELEC Guide 6, Clause 8 of "Guidelines for standards developers to address the needs of older persons and persons with disabilities" (also known as ISO Guide 71): ftp://ftp.cen.eu/BOSS/Reference_Documents/Guides/CEN_CLC/CEN_CLC_6.pdf.
- Hanson [16], and Czaja and Lee [17].

H.3.2 Technology

The multiple minor impairments associated with ageing indicate that older people might benefit from the use of assistive technologies (detailed earlier in this clause) which can help people with the particular impairment(s) they have.

However, many older people who could benefit from assistive technologies do not use them because they are not aware of them, or consider it too complex to purchase, install and learn how to use them.

Additionally, many older people, particularly those who are less experienced in using the Web, may have difficulty understanding the relationships between web content, web search mechanisms and the web browser. While this may not stop them from successfully using the Web, it can inhibit the effectiveness of instructions or help that assume a knowledge of the relative roles of a browser, a search tool and a web page.

H.3.3 Scenario

Barbara's sight is not as good as it once was, and she uses a magnifying glass to read text in newspapers. She is constantly told by her grandchildren that the web is a much better place to get her news from. She has put off going online for years because she did not want to feel foolish and "break the Internet" in classes to learn web skills. But she's now being taught at home by her granddaughter, and she is starting to get the hang of it. She was initially concerned that she would need to use her magnifying glass to read the text on the screen, but her granddaughter has shown her a way to make the text bigger without the magnifying. She is finally beginning to understand what all the fuss is about.

Annex I **Examples of web product purposes, audiences, user goals, user tasks and degrees of user-experience for those tasks**

NOTE 1 This informative annex provides information and guidance. It is intended to be read in conjunction with Clause 1 to Clause 8 of this British Standard.

NOTE 2 While the information in this annex is intended to be useful to everyone, it is specifically aimed at those responsible for defining the user goals and tasks the web product needs to provide (see 6.6) and the degree of user-experience for those tasks (see 6.9).

I.1 Two example websites: showing purposes, audiences, user goals, user tasks

- 1) A local government website.
 - Purpose: to find out information about their local government's services.
 - Audience: anyone from age 18+.
 - Example user goal: Find out when my rubbish gets collected.
 - Example user task: Search for rubbish collection on the website.
- 2) An online multimedia online game website.
 - Purpose: playing a game, to have fun, with an online community.
 - Audience: depends on the nature of the game, but could include children for child-friendly games.
 - Example goal: learn how to play the game.
 - Example task: read the instructions.

I.2 Discussion of degrees of user-experience for the two examples

- 1) The local government website.
 - Could be said to be technically accessible if the information on it is in a form which different disabled people could find and access.
 - Could be said to be usable if the information on it is in a form which different disabled people can find in a reasonable time, and can then understand reasonably easily, for example: including information in "easy read" format or spoken format for those with a literacy difficulty, or in a video in British Sign Language for the deaf community.
 - Could be said to be satisfying if the user came away from reading the information having appreciated the way it was written and the ease of finding it.
 - As the main purpose of the website is finding local government information, ensuring that information is usable satisfies the user-experience goals of the site for all user groups.
- 2) The game website.
 - Could be said to be technically accessible if you can control the input to the game and perceive the output from it.
 - a) To give one example, if you could map all of the controls for the game onto a single switch and a mechanism which would cycle around the control options until getting to the one the user wanted.

- Could be said to be usable if the input controls and perceivable outputs enable disabled users to play the game in a way that allows them to understand and experience the different features and be able to efficiently and effectively interact with different players and game options, and thus progress through the stages of the game. This is normally summed up in the idea of the “gameplay” (whether the level of challenge in progressing through the game is pitched high enough to be satisfying, but not too high as to make it impossible for a user to progress through familiarity and practise).
 - b) To continue the example, if the speed of the game meant that the user could not run away from ghosts quickly enough using the slow single-switch options, the game would be accessible, but not usable – it would result in frustration and no fun.
- Could be said to be satisfying, if the person enjoyed the game. This could be a combination of the gameplay (it was usable) and the production quality of the game (the idea or story behind the game, the characters, and the way the game looks and sounds) – so they wanted to play the game again.
 - c) To continue the example further, if the thing most gamers loved about a game was the amazing music during play, then deaf people would miss out on the unique selling point of the game’s user-experience.
- As the main purpose of a game is to have fun, production teams need to ensure, as much as reasonably possible, that the full satisfaction of playing the game is available to all users.

I.3 Common degrees of user-experience for Web 2.0 web products

	Technically accessible	Usable	Satisfying
Information	Can I reach the information I require?	Can I interact with the information where required?	Can I enjoy collecting the information and act upon what I have accessed?
Entertainment	Can I reach the interactions required in the way I want	Can I play the game at a comparable speed to my peers in spite of my disability or is this simply not possible?	Can I enjoy the game and compete with my peers on an equal footing?
e-Learning	Is the content, which aims to help me learn, in a form that is available to me?	Can I actually learn from it (is it “at my level”)?	Do I actually want to bother, or is it just too boring because the version for me does not include the things that make it engaging for other users?
Commerce	Can I get enough information from the site to know what I want to buy?	Can I actually work out how to buy it from the site?	Would I want to do so again? Was the process a better experience than the alternatives (going to an online competitor, going to the shops, etc.)?
Community	Can I access the community – sign-up, read and contribute?	Does the community software allow me to read and contribute in a way I can use and understand?	Can I get the real feeling of being a “part” of the community?

I.4 Common degrees of user-experience for different user groups and goals

Technically accessible	Usable	Satisfying
The user can access all the information and functionality that they need to meet their goals	The user can use the information and functionality to meet their goals efficiently and effectively	The user has an enjoyable experience, e.g. may spend longer on the site than necessary because they are enjoying the interaction
Examples		
The web content can be read by a screenreader	The user can find the product they are looking for quickly and easily	The user found what they were looking for and enjoyed reading about the different products available
A deaf person is able to read the subtitles on a video	The subtitles contain all the pertinent information the deaf person requires	A deaf person had access to real-time captioning and could enjoy watching the video whilst understanding what was being said
A blind person is able to access an audio description of a video	The audio description contained all of the information to enable the blind person to understand the action of the video	The audio description was written in a style fitting to the genre of the video so it is both enjoyable and informative
A person with multiple sclerosis can read a novel online	The user is able to adjust their browser settings to a colour combination that they can read	They are able to enjoy the novel online

Annex J Measuring user success (informative)

NOTE 1 This informative annex provides information and guidance. It is intended to be read in conjunction with Clause 1 to Clause 8 of this British Standard.

NOTE 2 While the information in this annex is intended to be useful to everyone, it is specifically aimed at those responsible for defining the user goals and tasks the web product needs to provide (see 6.6) and those responsible for conducting user testing with disabled and older people (see 8.4.6).

J.1 Key performance indicators

Tasks will depend on the aims of the web content, but examples might include.

- a) Find out how to contact the organization via email, phone or letter (for any site).
- b) Find out what services are available on the site (e.g. a sitemap, for any site).
- c) Find out a commonly searched-for bit of information (for information sites).
- d) Buy a product in a reasonable length of time (for an e-Commerce site).
- e) Successfully learn the thing you went to the site for (for learning/education sites).

J.2 Criteria for measuring success

Criteria for determining success include:

- a) Effectiveness:
 - How often can disabled users complete each task? (task completion rate)
 - How well can they complete each task? (degree of completion, error rates)
- b) Efficiency:
 - How much effort does it take to complete each task? (number of keystrokes/ clicks, time taken, pauses)
- c) Satisfaction:
 - What is an appropriate experience? (different for education, banking, entertainment, buying products)
 - Does the experience fit with your brand values?
 - Perceived efficiency.
 - Perceived effectiveness.

Annex K The user-personalized approach to accessibility (informative)

NOTE 1 This informative annex provides information and guidance. It is intended to be read in conjunction with Clause 1 to Clause 8 of this British Standard.

NOTE 2 While the information in this annex is intended to be useful to everyone, it is specifically aimed at those responsible for considering the accessibility production approach to be used (see 6.8).

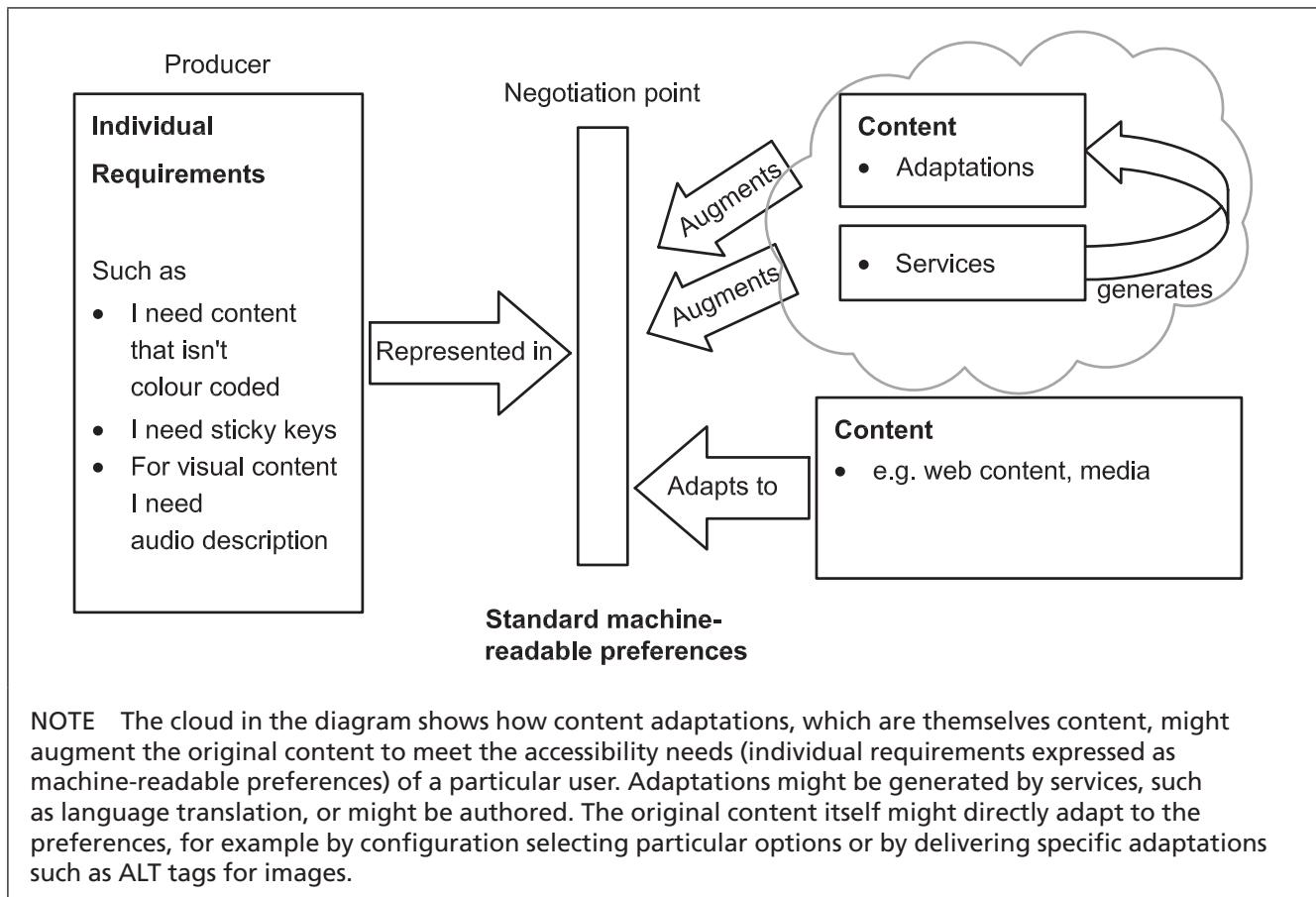
K.1 General

The user-personalized approach to accessibility is based on the idea that the only way to be completely sure that some product is accessible to, and optimal for, that individual is to conduct a negotiation with them. This means providing a mechanism whereby the individual can say "this is what I need" (their set of individual preferences) and have the system or content adapt to match what that user needs (see Figure K.1).

This approach is similar to writing a profile in systems like Facebook or Yahoo but what is expressed is a set of individual accessibility preferences which might not be about disability but instead be direct technical requirements. This has the advantage that a system using the preferences does not need to know why the technical aspect is required – it can meet the needs for many more situations without knowing the causes. For example, a user's need for audio content might be because of visual impairment or it might be that the user is driving at the time – the system does not need to know which it is.

Each user would have one or more individual sets of preferences expressed this way, read at delivery time, to determine exactly what is to be delivered to him or her. Content might incorporate appropriate accommodations and directly match requirements in the preferences (this is traditional accessible design or it might be augmented by content drawn from "The Cloud". Adaptations for content might be generated by services (for example a language translation service) that might be generated at delivery time. Such adaptations might be also be generated and packaged before the content is delivered or even generated and delivered afterwards.

Figure K.1 Architecture for user-personalized accessibility



In a full implementation of the approach content would have associated metadata (similar to tags or labels) that matches with what can be expressed in a set of preferences.

Development of standard sets of preferences and architectures for this kind of content delivery is not yet mature.

However, a great deal of work is currently underway and has produced results that are useful now and likely to be more so during the life of this standard. Even without widely implemented delivery architectures, the sets of preferences can be useful when designing content. If we look at the technical requirements expressible in a standard set of preferences we gain some clues as to what requirements we might need to adapt content to in order to meet individual needs.

For these reasons, here are some useful preference sets and projects that are implementing the approach. Where a user-personalized approach to accessibility is being used, organizations are recommended to consider the preferences expressed in these preference sets at content design time to determine whether or not the content could meet the preferences or needs expressible and that they are further considered for implementation in appropriate projects.

K.2 IMS AccessForAll 3.0

AccessForAll 3.0 is a developing IMS accessibility preferences specification which describes:

- machine-readable individual accessibility preferences;
- the corresponding metadata associated with content.

Using both aspects together allows preferences to drive the selection and configuration of content, and both location and selection of adaptations for that content.

The specification is based around knowledge-orientation and the Semantic Web. It is intended to be easily implementable using the Resource Description Framework (RDF – <http://www.w3.org/RDF/>) and to integrate work in ISO/IEC SC36 and W3C so as to seamlessly operate across different device environments, such as desktop machines and mobile devices.

At time of writing it is under development and a draft is expected to be public around the end of 2010 and will be available at <http://www.imsglobal.org/accessibility/>

NOTE 1 AccessForAll 3.0 replaces the previous IMS AccessForAll 1.0 (available from <http://www.imsglobal.org/accessibility/>), and builds on BS ISO/IEC 24751¹⁾.

NOTE 2 Each version of the AccessForAll specification was designed to operate as an integrated set of preferences and metadata. They are not designed to interoperate with each other across versions as they use different technologies and differently organized content.

K.3 Implementations of AccessForAll 3.0

Current tools which implement AccessForAll 3.0 include:

- MyDisplay from the BBC (trialled from November 2010). This allows its individual users to specify preferences for how they wish to view web pages, and changes pages across the whole [bbc.co.uk](http://www.bbc.co.uk) site to respond to the user's preferences. It aims to allow its preferences to be exported in AccessForAll 3.0 RDF format for interoperability with other accessibility personalization systems;
- the European Unified Approach for Accessible Lifelong Learning (EU4ALL: <http://www.eu4all-project.eu/>) project is designing a framework for the delivery of accessible lifelong learning in Higher Education in Europe: as part of that work the project is implementing BS ISO/IEC 24751 and parts of AccessForAll 3.0;
- Teachers' Domain (<http://www.teachersdomain.org>) is a free digital media service for educational use from U.S. public broadcasting and its partners. It uses Access for All 3.0 to inform users about media that matches their preferences and to warn them about inaccessible or hazardous media.

Annex L (informative) Procurement of authoring tools, software, components or web-services

NOTE 1 This informative annex provides information and guidance. It is intended to be read in conjunction with Clause 1 to Clause 8 of this British Standard.

NOTE 2 While the information in this annex is intended to be useful to everyone, it is specifically aimed at those responsible for the procurement of authoring tools, software, components or web-services (see 6.11).

L.1 Context

Organizations wishing to implement or enhance a web product are likely to do so by procuring services and software:

- Services will be used to augment or complement in-house skills required in the design, development, testing or other aspects of the delivery process.
- Software will be used as a component of the solution or the underlying framework upon which the web solution is built.

¹⁾ Available as a free download from <http://standards.iso.org/ittf/PubliclyAvailableStandards/>.

NOTE 1 Entirely bespoke development has become a rarity and most organizations are likely to rely, to some extent, on commercial or Open Source "off the shelf" software in the delivery of web products. This is likely to be implemented directly by the organization's own developers, or indirectly via an agency contracted to create the product for them.

NOTE 2 Organizations might procure a complete solution (that is, both services and software) from a single agency or supplier.

The accessibility of the web product will be dependent upon the capabilities of the service providers contracted by the organization to perform work and the accessibility of the underlying software used to implement the solution. It is therefore essential that the procuring organization is diligent and performs necessary checks to ensure that service providers have the requisite experience and that the software will not constrain the accessibility of the product.

The remainder of this annex provides guidance regarding:

- software selection;
- procurement of Design and Development services; and
- procurement of Testing / Auditing services.

NOTE 3 Testing for accessibility will need to be done during the software selection and design and development processes. Therefore organizations procuring software or design/development services will also need to procure accessibility testing services if they do not have the necessary accessibility testing skills in-house.

NOTE 4 There are legal reasons to ensure software selected for procurement is accessible. These are discussed at C.6.2.

L.2 Software selection

L.2.1 General

To check the accessibility of software (for example, frameworks or content management systems), ask the following high level questions during the procurement process:

Does the software allow solutions to be created from it which adhere to industry standards such as W3C WCAG 2.0 and ATAG 1.0? (see Bibliography for further examples.)

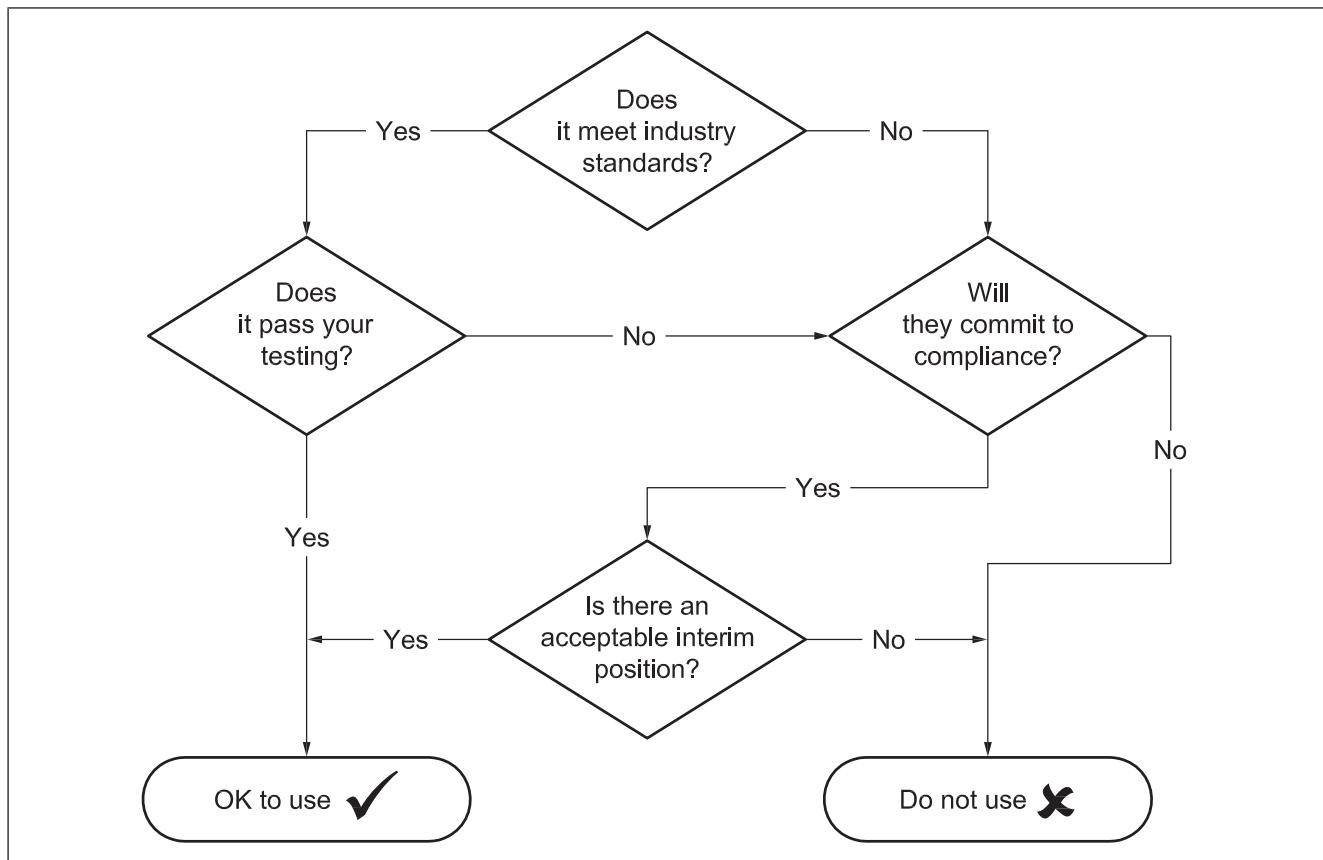
- If it does
 - Can claims of conformity against the standards be verified through independent testing?
- If it does not
 - Does the supplier understand the reasons for why this is?
 - Will the supplier commit to compliance in the future?
 - In lieu of compliance is there an acceptable interim position, e.g. mitigating controls?

If the software does not allow solutions to conform to industry standards and there is no commitment to adherence by the supplier and there is no acceptable interim position then it would be inadvisable to purchase the software.

This approach ensures that the purchasing organization is asking the right questions of the supplier and not relying solely on the supplier's own perceptions of the accessibility of their product.

It also recognizes that in practice it might be necessary for an organization to purchase software that does not adhere to industry accessibility guidelines. In this case, the organization will be making an informed decision that balances risk of accessibility issues against the business need and mitigating controls, e.g. reasonable adjustments.

Figure L.1 Decision process for software selection



L.2.2 Incorporating or linking to third party products

Some web products incorporate or link to the products of third parties.

The degree of care needed in selecting such third party products depends on:

- If the third party product is incorporated in the organization's web product:
 - The procurement of that third party product (for example a third party booking engine in a travel firm's web product) needs to follow the processes described in this Annex to ensure that the third party product is accessible.
 - If the third party's product is not accessible, there is a risk that both the organization (in our example, the travel firm) and the third party provider will be in breach of the Equality Act and the DDA because each company is likely to be classed as a service provider (see C.6.1).
 - The incorporation of third party "widgets", "gadgets" and "apps" might also give rise to such responsibilities.
- In contrast, where the organization's web product provides only a hyperlink to a third party's web product:
 - It is highly unlikely that the organization will be classed as a joint provider of the third party's product. A court is unlikely to consider the provision of a link sufficient to assume responsibility for a third party's web product.

L.3 Design and development services

When procuring services for the design and development of a web solution the same principles will apply with respect to understanding the supplier's level of knowledge about accessibility and capability in delivering accessible solutions:

- Does the supplier have a practical understanding of BS 8878, W3C guidelines and specifications and assistive technologies, and can they show demonstrable experience of applying these well (e.g. reference sites or clients)?
- How will the needs of disabled and older users be taken into account during requirements gathering and design?
- How will the supplier's design and development process deliver a solution which meets those needs?
- How will accessibility be verified during the design and development process?
- How will the supplier's solution help ensure accessibility of content and functionality after the web product has launched?

L.4 Testing/auditing services

Testing for accessibility will be conducted as part of product selection, during the delivery of a web solution or retrospectively as part of on-going quality assurance. The following questions will relate to one or more of these aspects:

- Can the supplier provide reference sites or clients for whom they have previously conducted accessibility testing?
- What is the supplier's approach to an accessibility test plan and what is the rationale for the methodologies and tools employed?
- What standards will be followed and what measurements will be taken during the accessibility testing?
- How will the results of the testing be recorded and presented?

Suppliers which follow the advice set out in Clause 8 are likely to provide better assurance of a solution's suitability for use by disabled people than those which do not.

L.5 General considerations

L.5.1 Documenting accessibility requirements and scoring responses

Organizations need to ensure that their requirements for accessibility are clearly communicated in procurement documentation, and appropriate weighting is given to accessibility criteria when scoring supplier responses.

EXAMPLE

"{organization name}'s technical guidelines and technical environment are documented in {document name}. Suppliers are required to highlight where their solution deviates from these. If an alternative is proposed, this should include reasoning and full costing. The failure to support {organization name} standards, such as accessibility or security requirements, can be a disadvantage for a supplier and a potential showstopper for their proposal."

NOTE Due-diligence discussions on the proposed design will be held with the potential supplier, with detailed technical checks on security, accessibility, software versions supported, future plans, etc.

L.5.2 Contracts and warranties for accessibility

Accessibility needs to be addressed in contracts for the supply of authoring tools, software, components or web-services. It may be appropriate for a contract to contain a warranty that, for example, a web product will conform to a particular Level of WCAG. Suppliers are unlikely to warrant that a web product will be “legally compliant” because only a court can decide whether a web product complies with the law (see C.8.1). Organizations ought to be sceptical of any supplier’s claim that its web products are “Equality Act and DDA compliant” because it suggests a misunderstanding of the legislation.

L.5.3 Checking a supplier’s competence in developing accessible web products

There is currently no nationally recognized system of accreditation for suppliers who claim to create accessible web products that uphold W3C guidelines and specifications. Organizations need to therefore perform their own reference checks until they are satisfied that the supplier has competence and experience in developing accessible web products that uphold W3C guidelines and specifications.

Annex M (informative) A guide to dealing with correspondence and complaints about a web product’s accessibility

NOTE 1 This informative annex provides information and guidance. It is intended to be read in conjunction with Clause 1 to Clause 8 of this British Standard.

NOTE 2 While the information in this annex is intended to be useful to everyone, it is specifically aimed at those responsible for reviewing and responding to correspondence and complaints about a web product’s accessibility (see 6.16).

M.1 General

How an organization deals with a comment or complaint about a web product’s accessibility can be vital in determining whether that complaint escalates into a dispute that may lead to negative publicity and/or legal action.

If a complainant appears to be threatening litigation, it may be appropriate to seek legal advice immediately. However, in most cases, comments or complaints about a web product’s accessibility can be resolved informally, provided all communications are handled diligently and sensitively.

The provision of contact details on a web product’s accessibility statement (see 5.3.4) makes it more likely that such communications will be channelled towards a person or a team that knows how to deal with them appropriately. It is prudent to acknowledge any such comment or complaint quickly, to reassure the complainant that it has been received and that it will be investigated. Contact details need to be included in the acknowledgement.

M.2 How to extract relevant information from the feedback

Sometimes a comment or complaint will be lacking details that are necessary to identify the nature of the problem the complainant is experiencing. It may be appropriate to request further information.

Consider the following:

- a) Is there enough information to diagnose who is having the issue.
 - It may not be clear if the person making contact is experiencing the issue themselves, or if they are contacting the organization on someone else’s behalf, or if they are speculating that others are likely to experience the issue.

- b) Is there enough information to diagnose what the issue is.
- Complainants may not know what causes the issue, and so may not give enough detail for the web product owner to understand the issue fully;
 - in this case, web product owners should request additional detail, such as:
 - the operating system, browser, type and version of any assistive technology the complainant is using;
 - any specialist settings or plug-ins installed on the complainant's machine which could potentially be causing the issue;
 - the task the complainant is trying to achieve;
 - the exact place where they encounter the issue; how the issue presents itself to the complainant; and whether it prevents them completing the task.
 - web product owners might usefully refer the complainant to WAI's useful guide for "Contacting Organizations about Inaccessible Websites" (<http://www.w3.org/WAI/users/inaccessible>) to help them provide this information.

M.3 How to respond to comments or complaints

Once the web product owner has gathered sufficient information to understand the problem, it should be investigated. Depending on the outcome of that investigation, they need to carefully consider the following courses of action:

- a) If the issue is the fault of the product, and it is reasonable for the product owner to fix it:
 - Reply to the complainant, assuring them that the problem is being addressed, with approximate timescales for the completion of that work. In determining the timescale, consider, for example: the nature of the fault, its impact on users, and the cost of the work necessary.
- b) If the issue is the fault of the product, but it is not feasible for the product owner to fix it:
 - Reply to the complainant to explain why the organization believes the fix is not feasible (with reference back to the web product's accessibility policy).
- c) If the issue is the fault of the product, but the product owner considers it unreasonable to fix it:
 - Reply to the complainant to explain why the organization believes the fix is not a reasonable adjustment (for example, because the cost is too high).
 - The reply should provide sufficient detail to the user to justify the organization's decision and should be as conciliatory as possible. For example, if the barrier is cost, perhaps the changes necessary can be included as part of a wider redesign that may be scheduled for a future date.
 - Before any such response is sent, it should be peer reviewed. Also consider seeking expert advice, including legal advice, before responding, since such responses may inflame a situation.
- d) If the issue is not the fault of the product:
 - Reply to the complainant, explaining:
 - how they can overcome the problem, using their assistive technology, if they are using one (as the user might not be using the features in their assistive technology correctly and might need training or support); and

NOTE 1 The amount of time spent educating the complainant needs to be reasonable, and can be reduced by referring to sites whose aim is to educate disabled users in the use of browser/OS accessibility settings

and assistive technologies (for example: a link to the My Web My Way page for how to change font and background colours).

NOTE 2 If the web product owner receives a number of similar requests for such education, it may be worth including information in the product's accessibility statement explaining how to use the product with any assistive technology with which complainants have had difficulty.

- the steps the organization has taken to make the product accessible (this could be a reference to this information in the product's accessibility statement), and any testing done to assure this accessibility.

Annex N (informative)

Suggested user profiles

NOTE 1 This informative annex provides information and guidance. It is intended to be read in conjunction with Clause 1 to Clause 8 of this British Standard.

NOTE 2 While the information in this annex is intended to be useful to everyone, it is specifically aimed at those responsible gathering requirements from disabled users (see 8.2) and conducting user testing with disabled and older people (see 8.4.6).

N.1 Vision impairment

Users with little or no useful vision, e.g. users of screenreader software.

Users with some useful vision, e.g. users of magnification software.

Users with considerable useful vision, e.g. users who might enlarge text in the web browser with high contrast and use Windows' colour preferences.

NOTE Because there are three main types of colour blindness it is unlikely that all problems would arise in user testing.

N.2 Mobility

Users with severe motor difficulties, e.g. users with Motor Neurone disease who might use switch access and an on-screen keyboard to interact with a computer.

Users with severe motor difficulties, e.g. users who are quadriplegic who might use speech recognition software.

Users with moderate motor difficulties or upper limb disorder, e.g. users who might only use a keyboard, a mouse being too difficult to use.

Users with mild motor difficulties, e.g. users who might use a mouse or equivalent access technology but who might have fine mouse control difficulties.

N.3 Cognitive and learning disabilities

Users with literacy difficulties or dyslexia, e.g. users who might change site colours and text formatting, and who in many cases might supplement this with text to speech software for reading sections of text.

Users with mild to moderate learning disabilities or cognitive impairments, e.g. users who might have difficulty understanding complex pages, or remembering passwords, and might rely upon another person to assist them.

N.4 Deaf and hard of hearing

BSL users are especially relevant if there is multimedia content on the site or language issues.

Non-BSL deaf or hard of hearing users.

N.5 Users who have more than one need

Many people have more than one need. Someone with a learning disability might also have a physical or sensory disability. Equally, someone with a motor difficulty might also be deaf. The combination of these needs affects how that person needs to access web products.

N.6 Older users

Older people represent an extremely heterogeneous group of web users, which much diversity in capabilities and experience. They are also likely to have more than one (usually, minor) need.

Annex O (informative)

A guide to user testing with disabled and older people

NOTE 1 This informative annex provides information and guidance. It is intended to be read in conjunction with Clause 1 to Clause 8 of this British Standard.

NOTE 2 While the information in this annex is intended to be useful to everyone, it is specifically aimed at those responsible for conducting user testing with disabled and older people (see 8.4.6).

NOTE 3 See 8.4 for other accessibility testing methods, and 8.3 for how to include user testing in an accessibility test plan.

O.1 Why is user testing with disabled and older people advisable?

User testing with disabled and older people often provides the best evidence of the web product's accessibility and usability as:

- people are unpredictable: how users interact with a web product is often different from the assumptions of web production teams. User testing often uncovers unexpected requirements;
- people are adaptable: designs that appear problematic might be usable in reality;
- web developers and designers become familiar with the features of their design solutions and frequently fail to notice problems that disabled users might experience;
- web developers and designers have different and sometimes conflicting goals to users. Often, user testing evidence is needed to qualify the relative merit of different design approaches;
- web developers and designers have computing skills, but might have limited knowledge of alternative computing environments. User testing provides real and often new insight into how different types of users access the web;
- business objectives can sometimes conflict with the accessibility of the web product, e.g. third-party delivered content such as advertising.

O.2 Advice on sample size

The expense of conducting user testing can mean that budgetary considerations only allow a very small sample. This can provide erroneous results, which need to be treated with due caution.

If more than one user experiences the same problem during testing, this provides stronger evidence that the problem will affect a significant number of users.

Consideration needs to be given to the expense of larger sample sizes versus confidence in the results.

0.3 Advice on disabled and older user recruitment

Organizations might contract a specialist recruitment agency to recruit users who exactly match the required criteria. This ensures the right user profiles are met while the randomness of the selection process provides added confidence in the results. However, this service can be expensive and time consuming and will need to be repeated for each round of testing.

Organizations might convene a panel of users to work with on a regular basis. This is less expensive and quicker to set up. However, these users will eventually develop expertise in using web products in general, and how the web product to be tested works, making them less likely to experience the same usability problems as novice users.

0.4 Advice on choosing the evaluator for user testing

Using a specially trained evaluator to conduct user testing ensures confidence that the findings of the testing have been based on data derived from a proven method, and trained observers can not only identify usability problems, but explain why users are having difficulties.

Where an organization doesn't have specially trained evaluators on staff:

- there are many specialized usability suppliers with trained evaluators who can run user tests following rigorous methods.
- a less expensive alternative is for an internal evaluator, who has not been involved in the design or development of the web content, to sit beside selected users as they attempt to use it.

0.5 Advice on ensuring reliability of the testing methodology

Although focus groups can be used effectively to gather requirements, it is inappropriate to use them to identify usability errors.

Usability tests require that representative users actually use an interface as they attempt to complete critical tasks. It is their success or failure to complete tasks which is the most important measure, rather than their subjective assessment of a design.

Therefore the evaluator ought not to simply show a web product to users and ask them what they think of it. They ought to ask users to perform given tasks to complete. They ought to observe whether they have any difficulties such as navigational issues, use of site search or system ambiguity.

Although using an untrained evaluator will be less expensive, the results might be less reliable. This is because they might not realize the underlying user problems, might attach more significance to a problem than there really is, or allow personal opinions to get mixed into the results. It is also difficult to ensure that users feel at ease and confident to talk about the problems they are having with the interface. An untrained evaluator might inadvertently prevent the users from communicating problems they are experiencing.

0.6 Advice on ethical issues

Organizations are advised to ensure that all testers who work with disabled and older people on their behalf are aware of best practice Codes of Conduct. These cover how consultants and researchers should conduct themselves, to ensure any ethical or practical issues are taken into account before embarking on user testing with disabled people.

Codes of Conduct are available from: the Usability Professionals Association (UPA) (see <http://www.upassoc.org/>) and Market Research Society (see <http://www.mrs.org.uk/standards/guidelines.htm>).

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Useful web sites

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AbilityNet <http://www.abilitynet.org.uk/>

Adobe Accessibility Resource Centre <http://www.adobe.com/accessibility/>

Becta (British Educational Communications and Technology Agency)
<http://www.becta.org.uk>

How people with disabilities use the web <http://www.w3.org/WAI/intro/people-use-web>

IBM Human Ability and Accessibility Center <http://www.ibm.com/able/>

Just Ask: Integrating Accessibility Throughout Design <http://www.uiAccess.com/JustAsk>

Microsoft Accessibility <http://www.microsoft.com/ENABLE/>

Royal National Institute of Blind People (RNIB) <http://www.rnib.org.uk/>

Shaw Trust <http://www.shaw-trust.org.uk/>

TechDis <http://www.techdis.ac.uk/index.php?p=9>

Usability Professionals Association (UPA) <http://www.ukupa.org.uk>

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Further sources of independent information and advice

NOTE Web addresses were correct at the time of publication.

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