

CREATING ASSESSMENTS THAT CONFORM TO W3C ACCESSIBILITY GUIDELINES

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Introduction

As Computerised Assessment becomes more widely accepted, they are also being more commonly applied within higher stakes testing, for summative assessment and examinations. In these situations, it is vitally important that authors and administrators are rigorous in making sure that their assessments meet the accessibility guidelines that have already been specified by the World Wide Web Consortium's (W3C) Web Content Accessibility Guidelines.

This paper outlines these guidelines and considers the steps that authors can make to achieve these goals. On a practical note, it also demonstrates how both authors and administrators can confirm to those guidelines using Questionmark Perception.

Background

Questionmark maintains a set of internal processes and procedures to review the most current accessibility standards provided, not just by the W3C, but also the US Federal government and other agencies and standards bodies. As well as being tested against the W3C guidelines, Questionmark Perception has also been evaluated against the Section 508 of the US Rehabilitation Act. A statement of compliance for Questionmark Perception V3 with Section 508 can be found on Questionmark's web site at:
http://www.questionmark.com/us/perception/section_508_compliance.pdf.

To complement this paper Questionmark has produced an assessment showing how these accessibility guidelines can be applied. To view the assessment, visit Questionmark's website at:
www.questionmark.com/uk/tryitout_features.htm. Once there select *Good Accessibility Assessment* in the Assessment Design Features section

General Principles

There are a number of general principles to which Perception authors should adhere if their assessments are to be accessible. Although these principles are not linked to any specific guideline contained in the W3C document, they are important to follow if users are to make their assessments accessible:

- *Use accessible templates* You can control the HTML that Perception produces by applying templates to your assessments that overwrite the settings in the Perception format files. You can download a ZIP file from Questionmark's website that enables you to produce questions and pages with features that aid accessibility. (www.questionmark.com/perception/help/articles/access/assessments.html)
- *Use accessible question types* There are two main types of Perception question types, those that are rendered using purely HTML form controls and those that are rendered by calling an additional technology. The following questions are rendered using purely HTML markup:
 - Explanation question
 - Multiple Choice (including Lickert Scale, Yes / No, True / False)
 - Matrix
 - Multiple Response
 - Text questions (including Text Match, Fill in the blanks, Essay)
 - Selection questions (including Pull down list, Select a blank, Matching, Ranking)

These questions types can be easily rendered by alternative user clients and accessed via alternative technology such as screen readers. In addition the format of these types can easily be modified by creating a format file that changes the way the HTML is produced and can thus be customised to accommodate emerging accessibility needs.

- *Use the standard delivery method* There are two main methods of assessment presentation when delivering an assessment using Perception. Which method of delivery is used is controlled by the template applied to the assessment.
 - Standard delivery presents all the questions in a question block at once to the participant. The participant's client is sent a standard page of HTML that contains all the questions and in a browser this is rendered as a scrollable page.
 - Question by question delivery is a method of delivery designed specifically for use with Internet Explorer V 4+ which, when rendered in that browser, delivers each question individually and offers the participant navigation controls to move from one question to another.

To comply with the W3C guidelines authors should use only standard delivery. Question by question delivery is dependent on Javascript, which will not be supported by some user's clients.

W3C Accessibility Guidelines

W3C provides us with a number of challenges that we must overcome to ensure that the assessments we create using Perception meet accessibility guidelines. These are as follows:

Guideline: *Provide equivalent alternatives to auditory and visual content.*

Solution: To comply with this guideline documents need to include textual equivalents for every non-textual element on a page. For example images need to have descriptions encoded in the **ALT** attribute of the **IMG** tag. You can easily achieve this in your question content when, for example, you insert a graphic into a question using the **Question Editor** menu item **Question | Add Content | Graphic...** the resulting dialog box includes a space for the **ALT** text in the control entitled **Enter alternative text if the graphic cannot be shown**.

If you are adding graphics in HTML that you are hand-coding, rather than using the above mentioned menu item, then you should ensure that you include an appropriate ALT attribute in your tags.

Guideline: *Don't rely on colour alone - ensure that text and graphics are still understandable when viewed in monochrome.*

Solution: In fact, none of the system text presented by Questionmark Perception's Server relies on colour to convey its message. When designing questions, authors have several tools that allow them to add colour to their question content. For example, plain text content can have a Style applied to it. Authors should ensure that if they apply a style such as Blue that the question does not rely on the participant recognising the colour of the question content in order to understand the question.

Authors should also ensure that there is sufficient contrast between foreground and background colours when viewed by someone who has a colour deficit or is using a monochrome display.

Guideline: *Mark up documents with the proper structural elements. Control presentation with style sheets rather than with presentation elements and attributes.*

Solution: It is difficult for users of some specialised software to understand the organization of a page if inappropriate mark-up is used. For example using the **<TABLE>** tag to position content on the page or using a heading tag to embolden text. If you are including your own HTML content in your questions you should use markup appropriately. The W3C provide further information on appropriate use of tags at <http://www.w3.org/TR/WAI-WEBCONTENT-TECHS/>.

Guideline: *Clarify natural language usage - use markup that facilitates pronunciation or interpretation of abbreviated or foreign text.*

Solution: If authors are embedding a snippet of another natural language in their question content then this should be flagged in the markup to enable screen readers to correctly read the text. For examples if the question content is: What does "je ne sais quoi" mean? then the French content should be wrapped in the HTML tags **...**

If authors include acronyms or abbreviations in their question content then the expanded version of these should be flagged by correct use of the **<ACCRONYM>** and **<ABBR>** tags.

Guideline: *Create tables that transform gracefully.*

Ensure that tables have necessary markup to be transformed by accessible browsers and other user agents.

Solution: If you are presenting tabular information as part of your question content then there are various HTML techniques you can use to ensure that the tables are rendered correctly in various user-agents.

For example, appropriate use of **TD**, **TH** and **THEAD**, **TFOOT**, and **TBODY** to group rows, **COL** and **COLGROUP** to group columns, and the **AXIS**, **SCOPE**, and **HEADERS** attributes, to describe more complex relationships among data.

Guideline: *Ensure that pages featuring new technologies transform gracefully.*

Solution: Web site designers who wish to include new technology features in their pages (such as scripts, applets, and other programmatic objects) should take steps to make sure that when these are not supported or turned off, then their pages will still render correctly. The information should be delivered by the programmatic object delivered in some other means.

As far as question and assessment authors are concerned the advice would be slightly different. This is because often the programmatic object will be part of your question content precisely because this is the only way to achieve a particular goal. For example, the only way to implement a *Perception Drag and Drop* question is via a Java applet. Authors should therefore assess whether the question type is the only way of assessing the knowledge they wish to assess. *Perception* uses scripts in the login page, when using **question by question** delivery, in numeric, drag and drop, matching, ranking, Java and Flash questions, and to handle processing of the submit and other buttons

Guideline: *Ensure user control of time-sensitive content changes.*

Solution: This guideline refers to moving and flickering text and objects. Nothing in *Perception* causes moving or flickering objects and to make assessments accessible authors should not include such content in their questions.

Guideline: *Ensure direct accessibility of embedded user interfaces.*

Ensure that the user interface follows principles of accessible design: device-independent access to functionality, keyboard operability, self-voicing, etc.

Solution: To make assessments accessible, any embedded objects in questions should have a device-independent accessible interface. Authors should ensure that their questions do not contain embedded objects that cannot be accessed via alternative input devices. In particular *Perception* authors should note the accessible question types listed in the section above, as other question types may contain objects that do not have device-independent interfaces.

Guideline: *Design for device-independence (Use features that enable activation of page elements via a variety of input devices).*

Solution: For web page designers the guidance is that a user should be able to interact with a page using their preferred input (and output) devices. So for example controls on a form should be activatable using a variety of input devices, and not just a pointing device such as a mouse.

Once again, assessment authors should stick to questions in the Accessible question types list shown earlier in the section - these are comprised solely of HTML form controls and conform to this guideline. Should an author need to cater for an access requirement that is not met by the HTML that *Perception* produces, then the short term solution would be for the author to make a *Perception format* file that altered the way *Perception* produces the HTML for that question type.

Guideline: *Use interim solutions (i.e. Use interim accessibility solutions so that assistive technologies and older browsers will operate correctly).*

Solution: The guidance in this guideline is interim guidance, which is valid until browsers and other client software address the issues raised in this guideline.

The specific point in this guideline that assessment authors should address is to avoid creating new pop-up windows. Authors could create pop-up windows by placing links in their assessment content whose **TARGET** attribute is set to create a new window. This should be avoided.

Guideline: *Use W3C technologies and guidelines (i.e. use W3C technologies (according to specification) and follow accessibility guidelines).*

Solution: This guidance advises that only W3C technologies should be used. For *Perception* authors, sticking to the accessible question types listed in the section above will ensure that this guideline is adhered to.

Guideline: *Provide context and orientation information.*

Solution: To comply with this guideline question authors who are incorporating large amounts of information in their questions (e.g. by presenting a lot of text in an Explanation question) should break up large blocks of text into logical groups.

Guideline: *Provide clear navigation mechanisms (eg orientation information, navigation bars, a site map, etc).*

Solution: The information in this guideline is primarily useful to people designing websites as opposed to *Perception* authors who are more concerned with the accessibility features of the individual question pages. However, the guidance does mention that navigation items on a page should be clear, used in a consistent manner and should preferably appear in a navigation bar. The look and feel of the *Perception* question page is achieved through the use of *Perception* templates. To make assessments accessible, *Perception* authors should avoid designing templates that make finding the **Submit**, **Continue**, **Reset** and other buttons difficult. *Perception* authors

should also avoid creating multi-block assessments that use radically different look and feel templates from block to block.

Guideline: *Ensure that documents are clear and simple (so they may be more easily understood).*

Solution: The look and feel of Perception question pages is controlled by the use of templates. To make assessments accessible, authors should avoid designing templates that create a busy, complex screen.

Checking Accessibility

If you would like to check out the accessibility of web pages there are a number of tools available that will enable you to do this. These may be useful when authors are testing their assessments to see if they are accessible. It can however, be difficult to test dynamically created content as opposed to static pages in some of these tools.

The following list gives examples of tools that can be used to check your pages:

- CAST (www.cast.org) is a not for profit organization that uses technology to expand opportunities for all people, including those with disabilities. Their service called Bobby (www.cast.org/bobby/) allows page designers to identify and repair significant barriers to access by individuals with disabilities.
- WAVE (www.temple.edu/inst_disabilities/piat/wave/) is a service offered by Pennsylvania's Initiative on Assistive Technology (PIAT). This service is particularly useful as a link can be dragged to your browser's link bar and this link can be used to provide a report on the accessibility of any page you view in your browser. This is useful for checking question pages produced by Perception that it would not necessarily be easy to access using a URL. For the WAVE link to work you will need to have your assessments available on a publicly accessible web server.
- Vischeck (<http://vischeck.com/index.php3>) provides an online method of checking what a page looks like to someone who is colour blind.

Once again, please check the assessment on Questionmark's website at: www.questionmark.com/uk/tryitout_features.htm. Which shows how these accessibility guidelines can be applied. Once at the page, just select *Good Accessibility Assessment* in the Assessment Design Features section. For more general information on Questionmark Perception, assessment accessibility and other issues concerning assessments, visit: www.questionmark.com