

Lourdes Moreno, Paloma Martínez y Belén Ruiz
{lmoreno, pmf, bruiz}@inf.uc3m.es
Computer Science Department
Universidad Carlos III de Madrid, Spain

THE ACCESSIBILITY CHAIN OF VIDEO ON THE WEB

The fact of having accessible applications at our disposal requires the combination of technological, legislative and human factors that take part in the edition of multimedia contents in the web. In order to supply the videos in the web with accessibility, there is a chain of links to be taken into account:

- *The video must be accessible itself*
- *Once the web page includes the video, it must still be accessible*
- *The interaction with the user must be accessible*

There are different platforms, software developers, languages, authoring tools, standards, accessibility guidelines to follow, etc. we have to work with in order to obtain accessible videos. In the context of video interaction there is also a diversity of user agents to be regarded such as different web browsers and media players, as well as the technical assistance or technology with which people with special needs have access to the Web, the screen reader for instance.



This way, this work's aim is to describe the chain of factors involved in the accessibility in the Web's multimedia contents as well as to offer designers an orientation about how to incorporate accessible videos in the Web.

It is a study [Moreno L., 2007] developed by part of the team of the [Centro Español de Subtitulado y Audiodescripción \(CESyA\)](#) with the eagerness of advancing and spreading ways of achieving the audiovisual accessibility.



The video must be accessible itself



The first link of the chain is making the content accessible. Multimedia contents are treated in Web Content Accessibility Guidelines ([WCAG](#)). The current version [WCAG 1.0](#) [W3C,1999] is less restrictive than the [WCAG 2.0](#) [W3C,2007b]. WCAG 2.0 demands alternative contents (caption, audio description, extended audio descriptions and sign language interpretation) to achieve different levels of accessibility as it is indicated in Table 1. But following the current WCAG 1.0 standard, the verification points of the standard to be fulfilled are [1.3](#) y [1.4](#).

It must be highlighted that in WCAG 2.0 there is a clear synchronization between the alternative contents. Moreover, it distinguishes between pre-recorded and live multimedia, audio description and extended audio description and includes new alternative contents such as sign language and complete transcription or video script.

It is important to differentiate between the alternative contents, that the captions can be open or closed, and that depending on this characteristic, the user may or may not be given the control on the activation or not of this alternative content.

Table 1.- WCAG 1.0 y 2.0. Accessibility criteria for audiovisual multimedia contents.

| WCAG 1.0 | WCAG 2.0 |
|--|--|
| Guideline | Guideline |
| 1. Provide equivalent alternatives to auditory and visual content.. | 1.2. Provide synchronized alternatives for multimedia |
| Checkpoints | Success Criteria |
| 1.3. Until user agents can automatically read aloud the text equivalent of a visual track, provide an auditory description of the important information of the visual track of a multimedia presentation. [Priority 1] | 1.2.2. Audio descriptions of video, or a full multimedia text alternative including any interaction, are provided for prerecorded multimedia. (Level 1). |
| 1.4. For any time-based multimedia presentation (e.g., a movie or animation), synchronize equivalent alternatives (e.g., captions or auditory descriptions of the visual track) with the presentation. [Priority 1] | 1.2.1. Captions are provided for prerecorded multimedia. (Level 1). |
| | 1.2.2. Audio descriptions of video, or a full multimedia text alternative including any interaction, are provided for prerecorded multimedia. (Level 1). |
| | 1.2.3. Audio descriptions of video are provided for prerecorded multimedia. (Level 2). |
| | 1.2.4. Captions are provided for live multimedia. (Level 2). |
| No aplicado | 1.2.6 Extended audio descriptions of video are provided for prerecorded multimedia. (Level 3). |
| | 1.2.5.- Sign language interpretation is provided for multimedia. (Level-3) |
| | 1.2.7.- For prerecorded multimedia, a full multimedia text alternative including any interaction is provided. (Level 3) |

As examples of software for developing accessible multimedia contents, there are a great number of tools aimed at the development and support of multimedia on the web as:

- Languages and formats to synchronize multimedia: [SMIL](#) [W3C, 1998], Microsoft® Synchronized Accessible Media Interchange (SAMI) [Microsoft, 2003] or [Timed Text \(TT\)](#) [W3C, 2006].
- Players, such as RealPlayer, QuickTime, Windows Media, etc.
- Caption and/or audio description editors for multimedia, such as [Media Access Generator \(MAGpie\)](#) [NCAM, 2003], [Hi-Caption Studio](#) [Hi Software, 2006] or utilities as [CaptionMeNow](#) [IBM, 2005].
- Editors to convert multimedia presentation to an accessible format such as [Flash Macromedia](#) [Adobe, 2006] used by many designers
- Others, such application as [SVG](#) [[W3C, 2002]] for images. The combination of using SVG and SMIL permits to create multimedia contents.

Due to the fact that these possibilities are not always compatible among them, we can find different platforms, property licenses, free software, etc. It is indispensable to follow the standards guides and recommendations of the W3C. For instance, the navigators and multimedia players must fulfil the User Agent Accessibility Guidelines ([UAAG](#)) [W3C, 2007].

Once it includes the video, the web page must still be accessible



Carrying on with the chain, we will consider the way of including the video in a web page to reproduce it, as in spite of the fact that the resource is still accessible, the way of reaching it may cause accessibility barriers. The

options to diffuse the video in a web page are: *download (file transfer)*, *progressive download*, and the option of *streaming*.

Each of the former options leads to different ways of implementation when including the access to the video in the code, and all of them must follow the Web Content's Accessibility Guidelines (WCAG). Thus, depending on the option chosen by the designer you will come across more or less difficulty in its codification.

The options that mean less difficulty and problems of accessibility validation at the same time are *streaming* and *download*, as it involves including in the web page's code a simple link to the video. Labelling this link properly following WCAG 1.0 in the applicable verification points such as [13.1](#) would not cause any failure that could put accessibility at risk, and the web pages that host videos could be validated according to WCAG 1.0. In the event of *streaming*, the reproduction is associated to a format and player, so the difficulty lies more in the diversity of formats and players, and which one(s) to be offered to the user, but we will talk about this in the next section.

However, the *progressive download* option does lead to implementation difficulties to follow the WCAG 1.0 guidelines, as its reproduction not only depends on the video's format or if it is associated to a player or navigator, but it also has exceptions caused by the conflict between standards and technological software platforms, as the most common method to include multimedia elements on a Web page is using the element `<embed>`, element that nearly all the known navigators support. But this element has a problem, if `<embed>` is used on a Web page, the code is not accessible according to WCAG. Most of Web designers prefer to use the element `<object>` of the (X)HTML standard instead of `<embed>` to add multimedia fulfilling guideline of [WCAG 1.0](#). But this solution also has a problem: there are navigators that are not able to correctly interpret this element. Moreover, this element was initially defined as a universal element (not associated to any specific player), but many browsers have not followed the standard. Even so, to use the element `<object>` seems to be the most appropriate way of integrating video into the Web page. There are options to include multimedia using `<object>` as [FlashSatay](#) [McLellan D., 2002], or [including the <embed> element to define a Document Type Definition \(DTD\)](#) [YoYoDesign, 2004], etc. Following this implementations, it is possible to fulfil the guideline of WCAG 1.0, and to validate the web page that includes the access to the video fulfilling the applicable verification points such as the [3.2](#). However, we have to point out that there is not a clear method of doing it that gives support to the new designer.

An alternative to this method is to use the (X)HTML `<object>` element, the emerging format in the web is Flash, although it is not a public-domain software, most users have installed this software in their computers, because it is compatible with most of the navigators. This option permits to use the connector integrated without the necessity of installing a new player. Like before, there is not a clear method, but there are solutions to include the Flash content in an accessible way in a Web. Developers have created techniques that [allow adding Flash](#) content without interfering in the validation of the pages according to WCAG 1.0, standing out Flash Satay, UFO, FlashObject, FlashAcces among them as well as the method that proposes Macromedia [Kirkpatrick A, Regan B., 2006]. The discussion arouses when we want to know which of these methods provides a simpler and more accessible way of achieving it.

Other implementation possibility associated in this option to a navigator (without a placer if desired) is to use the [profile SMIL+XHTML de SMIL 2.0](#) . This option has a

problem: currently, this profile can only be reproduced using Internet Explorer (version 6.0 and higher), but it is supposed that in the future other navigators will permit it too. On the other hand, this implementation has a big advantage: it can be directly integrated in the XHTML code without any player associated via the <object> element.



Finally, another option to consider is the reproduction of a video content associated to an external player. In order to include adaptability to the user, providing him/her some control on the reproduction of the video. The [experiment](#) described in [Moreno L., 2007b] has been carried out with an interface developed using SMIL 2.0 and the reproduction is associated to an external player. [SMIL](#), standard of the W3C is a market language which creates multimedia presentations containing audio, video, image and/or textual elements. Due to the fact of being an XML technology it has a lot of power and flexibility, as the different alternative contents are separately stored and reproduced in a synchronized way. SMIL is compatible with the following players: QuickTime Player, RealPlayer, Grins player and Ambulant among others. It is important to underline in this point that different players of SMIL provide different levels of implementation, that is to say, not every accessibility characteristic described by SMIL is supported by the player. Although the interface has been developed by SMIL, not all the players implement it in the same way, and the results are slightly different. This is a disadvantage, because if both the editors and the user agents to the web implement SMIL in a certain way, it is sometimes difficult to follow a universal design, there could be exceptions when following the verification point [11.1](#) of WCAG1.0.

The interaction with the user must be accessible



Finally, we reach the last link of the accessibility chain, this is the access of the user to the video must be besides possible, intuitive in the interaction, provide accessibility as to how to show the access and control information to the user. This way the verification point [14.1](#) [ref] could be applicable according to the WCAG 1.0 standard, what indicates that a straightforward language must be used.

So that users can have access to the video's reproduction in accordance with his/her characteristics and preferences, there are factors to be taken into account such as the video's size, the video's length, information of the progress in the reproduction, speed and type of connection of the user, user agent associated to the reproduction, video's format, if the user is going to have control, etc. Not all of these factors are always determinant, they depend on the mode chosen to have access to the video among those modes mentioned in the former section. For instance the video's size will be a relevant piece of information to be given to the user in the *download*, or *progressive download* options, but it is not necessary in *streaming*. Even though the verification point [11.3](#) of WCAG (priority 3) is not measurable, it could be considered as applicable in this case.

From here we launch the question to be discussed of how all that information should be shown (factors mentioned before, the software required, etc) to the user, as the

design of a good interface implies a vast investigation and evaluation, with a necessary test by users to cover aspects further than those of technical accessibility and usability criteria.

CONCLUSION

A chain of links that must be fulfilled in order to offer a complete accessibility to a video has been depicted, as well as different options of how to include videos in the Web pages. All of the alternatives seen when put into practice can achieve a high grade of accessibility, but there are exceptions, advantages and disadvantages depending on the technology and method used. With the technological resources at our disposal, the designer will be the one who will make the decision of which one to use, but his/her objective must be accessibility in all its dimensions and to reach the biggest number of users as possible.

REFERENCES

- [Adobe, 2006] Flash Macromedia, http://www.adobe.com/devnet/flash/articles/flash8_bestpractices_09.html
- [Hi Software, 2006], Hi-Caption Studio, <http://hisoftware.com/hmcc/index.html>
- [IBM, 2005] CaptionMeNow, http://www-306.ibm.com/able/solution_offerings/captionmenow.html
- [Kirkpatrick A., Regan B., 2006] Accessible Flash. In search of... a perfect plugin technique, http://weblogs.macromedia.com/accessibility/archives/2005/08/in_search_of_a.cfm
- [McLellan D., 2002] Flash Satay: Embedding Flash While Supporting Standards, <http://www.alistapart.com/articles/flashesatay/>
- [Microsoft, 2003]. Microsoft Synchronized Accessible Media Interchange (SAMI), http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnacc/html/atg_samiarticle.asp
- [Moreno L., 2007] Moreno, L., Iglesias, A. and Martínez, P. Accessibility of Multimedia Resources in Web, WEBIST - International Conference on Web Information Systems and Technologies, Barcelona, España, March 2007.
- [Moreno L., 2007b] Moreno, L., Martínez, P., Ruíz, B., and Iglesias, A. Accessible interface for multimedia presentation in inclusive education, 12th Annual SIGCSE Conference on innovation and Technology in Computer Science Education, Dundee, Scotland, ITiCSE '07. ACM Press, NY, June 25 - 27, 2007.
- [NCAM, 2003] NCAM, 2003. Media Access Generator (MAGpie) <http://ncam.wgbh.org/webaccess/magpie/>
- [W3C, 1999] Web Content Accessibility Guidelines 1.0, <http://www.w3.org/TR/WCAG10/>
- [W3C, 1998] Synchronized Multimedia, <http://www.w3.org/AudioVideo/>
- [W3C, 2002] Scalable Vector Graphics (SVG), <http://www.w3.org/Graphics/SVG/>
- [W3C, 2006]. Timed Text (TT), <http://www.w3.org/TR/2006/WD-ttaf1-dfxp-20060427/>
- [W3C, 2007]. User Agent Accessibility Guidelines (UAAG), <http://www.w3.org/WAI/intro/uaag.php>
- [W3C, 2007b] Web Content Accessibility Guidelines 2.0, <http://www.w3.org/TR/WCAG20/>
- [YoYoDesign, 2004]. The embed element in XHTML 1.0, <http://www.yoyodesign.org/doc/dtd/xhtml1-embed.html.en>