

## Visualization of Accessible Multimedia Content in Web Pages

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*Multimedia content still presented on the web sites. The visualization of multimedia content by the users with disabilities, those that usually use screen readers, is extremely difficult. With the onset of the audio sequence of multimedia presentation it is difficult for users with visual impairs to listen the audio component of presentation and the audio version of the screen readers too, because the two audio streams cannot be controlled using only one volume control. Therefore, because of the difficulties to control the available audio streams and because of the difficulties to access the control buttons by people with disabilities, the multimedia content is often inaccessible for users with visual problems. More than this, the use of dynamic users' interfaces is a critical problem because the screen-readers cannot detect the dynamics in content changes.*

*The current paper presents some solutions for multimedia content production and distribution in distributed multimedia web presentations.*

**Keywords:** Accessible multimedia content, Synchronized Accessible Media Interchange.

### Introduction

The expansion of the multimedia applications from the last years partially due to the exponential growing of the Internet, led to a great usage of multimedia data. Therefore, the importance of accessible multimedia applications and presentations increased.

Multimedia data is heterogeneous from many points of view: some data is time dependent and the other is time independent; multimedia data uses different formats for data representing; some data is structured and some data is represented as unstructured or as semi-structured streams of data; some data can be transferred remotely in a short time and the others needs a large period to be transferred.[2] Because of multimedia data characteristics, their usage in accessible applications and presentations imply a lot of problems.

The multimedia applications could be inaccessible for peoples with some kinds of disabilities. Therefore, the people with hearing problems could not receive the audio component of the multimedia presentation and the people with visual impairs could not perceive the visual components: video sequences, static images and animations.

To represent the content of a multimedia presentation with an audio component only,

it is possible to transcript the audio part of the presentation in a text format.

In an audio-video presentation, the audio component transcript must be synchronized with the visual component (video sequences, images and animations). Similarly, the information presented visual exclusively to people with visual impairs, must be synchronized with the visual component of multimedia presentation and so, these could be perceived correctly by all kinds of users.

### 1. Developing Accessible Multimedia Content

**Descriptions** represent the standard solution for implementation of accessibility in video and audio sequences. [4] The descriptions differ from the subtitles because they do not give back only the dialogues and the action of the video sequences, but also contain information for speaker's identity, to identify the existence or the absence of sound effects, the content of the sound track and information about the mood of the characters.

The descriptions are synchronized with video sequences, so that the viewers' access equivalent information with the audio component presented. The descriptions could be open or close.

Open descriptions accompany the audio and

video sequence and could not be deactivate, while the close description could be activate and deactivate by the user (displayed or hidden).

**Audio descriptions** accompanied by a navigable interface make the video sequences accessible for people with visual impairs.

Audio descriptions allow presenting the key visual elements, including the actions, gestures and scenery changes. [4]

However, if the presentation is interactive and the users must interact with Graphical Users Interfaces elements, it is possible to have significant access barriers.

The people with visual impair can use software products of screen-reader type to access the interface elements of distributed presentations. Multimedia content accessible to the screen readers must carry out two requirements: distributed presentation should provide textual elements for each visual element of the user's interface and the screen-readers must have the access to this text.

The most of the media players could interact with the screen readers, allowing the control of the players, but rarely the both conditions are carried out.

The audio descriptions are useful not only for people with audible impairs but also for people that work in a noisy environment. Furthermore, the descriptions can be used to index and search the collection of video sequences because each description has associated the time when the text sequence must be render.

Storing descriptions of the audio sequence in a XML format allows descriptions to reuse, in distributed presentations played on mobile devices or using devices connected to the network with a low bandwidth. There are educational benefits and circumstances to use the audio descriptions for people who learn a foreign language, because they can have in a text format too, the equivalent of the audio sequence, which helps the learning of the foreign languages.

The descriptions may be included in the **video sequences** in two ways: being codified and included as part of the video sequences or can be provided as a separate text in a

format accepted by the media player, and will be displayed in the text format. [4]

Encoding descriptions as part of a video sequence is used when the video sequence was previously acquired. Creating a different channel, containing the descriptions, is useful when we want to use the subtitles and video sequence descriptions alternatively or descriptions in various languages or in different forms.

Each type of media player uses a method to distribute the descriptions together with multimedia data. QuickTime allows adding tracks to movie using the authoring tools or using a markup language, such as SMIL. In both cases, you can control the position of the track with description inside the movie.

In the case of Windows Media Player, to deliver the media stream accompanied by descriptions it is necessary to use a file, which sets out the link between the file containing the audio description or the video description (file described in SAMI format) and the media file.

## 2. Conditions for Accessible multimedia Applications

In terms of audio sequences included in a multimedia accessible application, they must meet at least one of the following conditions:

- ✓ To provide the transcript of the audio sequences, that is the text format version of the audio content. The user should be able to choose to read the transcript, to listen the audio sequence or may select the both variants.

- ✓ To provide a description of the audio sequence; description is longer than the transcript and depends on the author's options; description can be so subjective as well as artistic.

- ✓ To include in the audio sequence of a different channel that contain the transcript of the audio sequence. The transcript and the audio sequence will be synchronized and will be saved in a single multimedia stream.

The video content must meet the following minimum conditions:

- ✓ To provide the transcript of the video sequence, in a text format.

- ✓ To provide the audio recording of the

video sequence, that is the recorded description of the video content created by reading the transcription (text format) or by combining audio recording with the audio component and with the video sequence.

✓ To provide the synchronized audio descriptions for the video sequence. The description of video sequence contains any visual information including actions, status, and characters' description, elements needed to understand the video sequence. The description of the video sequence must be in an audio and text format.

To optimize the accessibility of multimedia presentations, containing the multimedia clips created using the Flash from Adobe, they must meet the following requirements [8]:

- ✓ To have the equivalent of the visual elements, in a text format.
- ✓ To include a full description of clips and of the other Flash objects and not just to use subtitles.
- ✓ To assign names to the graphics.
- ✓ To use alternative descriptions and to establish text equivalences of different sizes.
- ✓ Colors must be used effectively, there must be the contrast between the background color and text color, to avoid the use of intermittent text
- ✓ To use descriptors for informing users about the status of controls and they must be available to screen-readers.
- ✓ The web page elements must be accessible in a logical order of their appearance.
- ✓ To use simple controls, similar to HTML controls. Some screen reader is unable to display the controls with complex structures such as trees, slide, spin buttons, and so on.

### 3. Markup Language for Creating Accessible Multimedia Presentations

There are a number of markup language that contain features for synchronizing the descriptions of audio and video sequences with subtitles, textual descriptions, statics images and related animations that can be used to implement accessibility in the presentations and multimedia applications.

The most widespread marking languages are

SMIL (*Synchronized Multimedia Integration Language*) developed by the World Wide Web Consortium (W3C) and SAMI (*Synchronized Multimedia Integration Language*) developed by Microsoft.

SMIL is recognized by a large number of multimedia players, including Real Player and QuickTime starting with 4.1 version. Only Microsoft products recognize SAMI. SAMI and SMIL have similar functionalities that facilitate the implementation of accessible multimedia solutions.

The two markup languages allow the creation of simple multimedia presentations that integrate video and audio streams with text, images or other media. The integration is done by dividing the various media components in distinct streams and files, by playing them together, on the end user's computer, as would a single media stream. The markup languages are used to synchronize the distribution of text (subtitles) and audio descriptions with the associated video file.

SAMI can be integrated into a Web browser through the object-oriented model of the Microsoft Windows Media Player 7.

SAMI files are independent of the multimedia files and their functioning is not based on a certain audio or video format. Using distinct files, the player will do the analysis, the synchronization and will distribute each file to the client's computer in an independent manner. This ensures the increase of the level of functionality and flexibility because it allows the independent editing of SAMI files, the integration and the usage of SAMI file with various multimedia formats and the SAMI file storage in different locations.

### 4. Using SAMI for Synchronizing Descriptions with Video Sequences

The SAMI are text files with .smi or .sami extension containing the descriptions and/or subtitles of video and audio files with the temporal parameters used to control Windows Media Player to synchronize the text with the audio/video content.

The basic structure of a SAMI document is as follows:

```
<SAMI>
  <HEAD>
    <STYLE>
    </STYLE>
  </HEAD>
  <BODY>
    <SYNC Start = value ID=Source>
  </BODY>
```

```
</SAMI>
```

<SAMI> tag states that it is a SAMI document.

<STYLE> tag shall be used to define the styles of formats for subtitles.

<SYNC> tag shall be used to define the synchronizations in multimedia presentations.

The following example contains a video presentation of a product accompanied by the time-synchronized descriptions, in a text format, corresponding with the video sequence. The user can choose a larger or a smaller size for the font used to display the descriptions and can choose the language in which the text will be displayed.

The.html file presented bellow has the following functionalities:

- ✓ integrates the control Windows Media Player of ActiveX type, used to playback the video sequence and to set their properties,
- ✓ setting the properties of the Windows Media Player control in order to synchronize the video sequence with the text description stored in the .sami file,
- ✓ sets and formats the area used to display the text corresponding with the video sequence (subtitle or description),
- ✓ creates and manages the elements of the users' interaction, we defined two menus: one for selecting the font style used to display the text and the second to select the language used to displayed the text.

```
<HTML>
<HEAD>
<TITLE>Exemple of accessible multimedia presentation</TITLE>
<!-- When the web page is displayed the controls are loaded and we set the properties of these controls -->
<SCRIPT language = "JavaScript" for = "window" event = "onload">
<!--Player1.closedCaption.captioningID = "CaptionText"; Player1.closedCaption.SAMIFilename = "ex.smi"; Player1.closedCaption.SAMILang = CCLang.Value;
Player1.closedCaption.SAMISStyle = CCStyle.Value;
Player1.URL = "audio.wmv";-->
```

```
</SCRIPT>
</HEAD>
<BODY>
<!--OBJECT opens the ActiveX control of Windows Media Player in the web page-->
<OBJECT classid = clsid:6BF52A52-394A-11d3-B153-00C04F79FAA6 height = 300 id = Player1 width = 300>
<param name = "AutoStart" value = "false">
</OBJECT><BR>
<!--DIV demarcate the area used for displaying the corresponding text of the video sequence -->
<DIV style = "width:300; background-color:black"; id = CapText></DIV>
<!--SELECT creates a menu with the options "Small captions" and "High captions" use to choice the style used to display the text. SAMIS- tyle will contain the proper selection of the user>
<SELECT id = "CaptionsStyle" language = "JScript" name = CCStyle
onChange = "Player1.closedCaption.SAMISStyle = CCStyle.Value">
<OPTION value = "Small captions" selected
>Small captions
<OPTION value = "High captions">High captions
</SELECT>
<!--SELECT creates a menu with the options English and Romanian corresponding with the languages able to display the text. SAMILang =the name of the language selected by the user -
->
<SELECT id = "CaptionsLang" language = "JScript" name = CCLang onChange = "Player1.closedCaption.SAMILang = CCLang.Value">
<OPTION value = "English Captions" selected>English
<OPTION value = "Romanian Cap-
tions">Romanian
</SELECT>
</BODY>
</HTML>
```

The .sami document contains the following elements:

- ✓ defining characteristics of the two styles used to write the text,
- ✓ defining working variables associated with the language used to play the presentation,
- ✓ defining <SYNC> sections used to synchronize the text with the video sequence. In this section, it is specified the time, reported at the beginning of the video sequence, when each text sequence (subtitle or description) will display and the text itself in the two languages indicated.

```
<SAMI>
<HEAD>
```

```

<STYLE TYPE = "text/css"><!--
  <!--P defines the appropriate styles of the two
  user's options uppercase and lowercase text-->
  P {font-family:sans-serif; color:white;}
  #Small {Name:SmallPrint; font-size:10pt; col-
  or:yellow;}
  #Big {Name:BigPrint1; font-size:14pt; col-
  or:magenta;}
  <!--ENUSCC and ROROCC define the vari-
  ables used to indicate the languages for tran-
  scription and displaying of text -->
  .ENUSCC {Name:English; lang: en-US; SA-
  MIType:CC;}
  .ROROCC {Name:Romanian; lang: ro-RO;
  SAMITYPE:CC;}-->
</STYLE>
</HEAD>
<BODY>
  <!-- The first set of texts will be on display at
  100 ms-->
  <SYNC Start = 100 ID=Source>
  <--The text in English language-->
  <P Class = ENUSCC ID = Source>Presenter
  <P Class = ENUSCC> the text in english
  <-- The text in Romanian language -->
  <P Class = ROROCC ID = Source>Prezentator
  <P Class = ROROCC> textul 1 în română
  <!-- The second set of texts will be on display
  at 1200 ms-->
  <SYNC Start = 1200 ID=Source>
  <-- The text in English language -->
  <P Class = ENUSCC ID = Source>Producer
  <P Class = ENUSCC> the text in english
  <-- The text in Romanian language -->
  <P Class = ROROCC ID = Source>Producător
  <P Class = ROROCC>textul 2 în română
  .....
</BODY>
</SAMI>

```

## Conclusions

The support offered by a number of media players for audio descriptions is not good enough. Before people with sight problems can have total access to the distributed multimedia content, it is appropriate for the screen readers to interact better with media players. The offered support is appropriate for the data in a text format but is inadequate for displaying text superimposed over the video sequence or for displaying text that requires a special formatting such as mathematical formulas.

The markup languages SMIL and SAMI allow the implementation of accessibility in multimedia applications through the syn-

chronization of communication media in Web applications.

## References

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