Accessible multimedia

Another category of content that can create accessibility problems is multimedia — video, audio, and image content need to be given proper textual alternatives so they can be understood by assistive technologies and their users. This article shows how.

Prerequisites:	Basic computer literacy, a basic understanding of HTML, CSS, and JavaScript, an understanding of what accessibility is.
Objective:	To understand the accessibility issues behind multimedia, and how to overcome them.

Multimedia and accessibility

So far in this module we have looked at a variety of content and what needs to be done to ensure its accessibility, ranging from simple text content to data tables, images, native controls such as form elements and buttons, and even more complex markup structures (with WAI-ARIA attributes).

This article on the other hand looks at another general class of content that arguably isn't as easy to ensure accessibility for — multimedia. Images, videos, `<canvas>` elements, Flash movies, etc., aren't as easily understood by screenreaders or navigated by the keyboard, and we need to give them a helping hand.

But don't despair — here we will help you navigate through the techniques available for making multimedia more accessible.

Simple images

We already covered simple text alternatives for HTML images in our HTML: A good basis for accessibility article — you can refer back to there for the full details. In short, you should ensure that where possible visual content has an alternative text available for screenreaders to pick up and read to their users.

For example:

```
<img src="dinosaur.png"
     alt="A red Tyrannosaurus Rex: A two legged dinosaur standing upright
```

Accessible audio and video controls

Implementing controls for web-based audio/video shouldn't be a problem, right? Let's investigate.

The problem with native HTML5 controls

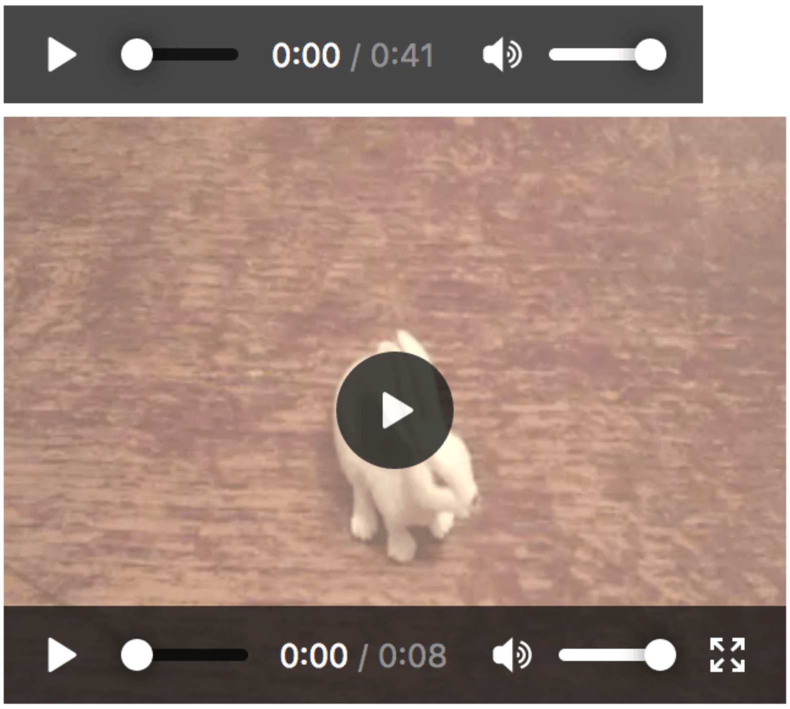
HTML5 video and audio instances even come with a set of inbuilt controls that allow you to control the media straight out of the box. For example (see `native-controls.html` source code and live):

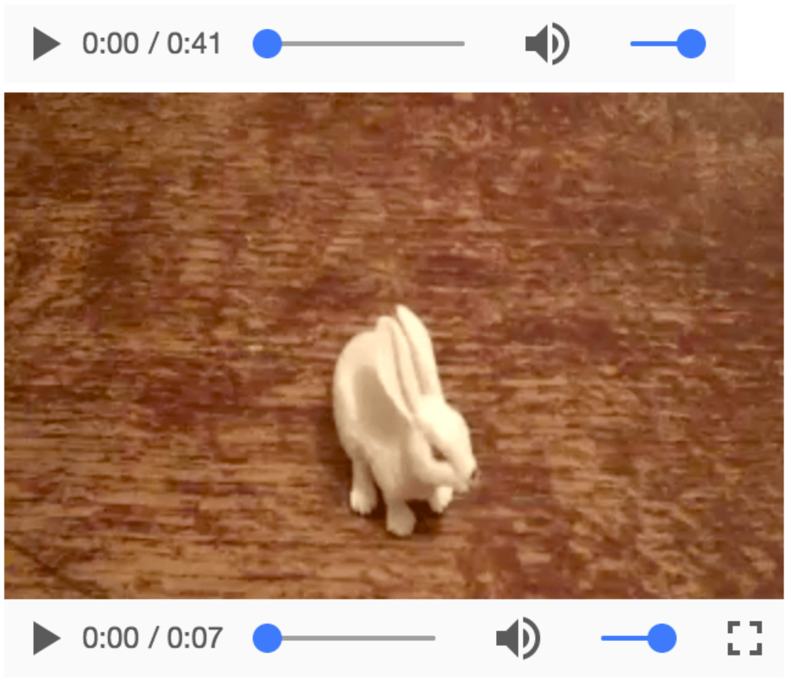
```
<audio controls>
  <source src="viper.mp3" type="audio/mp3">
  <source src="viper.ogg" type="audio/ogg">
  <p>Your browser doesn't support HTML5 audio. Here is a <a href="viper.m
</audio>

<br>

<video controls>
  <source src="rabbit320.mp4" type="video/mp4">
  <source src="rabbit320.webm" type="video/webm">
  <p>Your browser doesn't support HTML5 video. Here is a <a href="rabbit3
</video>
```

The controls attribute provides play/pause buttons, seek bar, etc. — the basic controls you'd expect from a media player. It looks like so in Firefox and Chrome:





However, there are problems with these controls:

- They are not keyboard accessible, in any browser except for Opera
- Different browsers give the native controls differing styling and functionality, and they aren't stylable, meaning that they can't be easily made to follow a site style guide.

To remedy this, we can create our own custom controls. Let's look at how.

Creating custom audio and video controls

HTML5 video and audio share an API — HTML Media Element — which allows you to map custom functionality to buttons and other controls — both of which you define yourself.

Let's take the video example from above and add custom controls to them.

Basic setup

First, grab a copy of our custom-controls-start.html, custom-controls.css, rabbit320.mp4, and rabbit320.webm files and save them in a new directory on your hard drive.

Create a new file called main.js and save it in the same directory.

First of all, let's look at the HTML for the video player, in the HTML:

```
<section class="player">
  <video controls>
    <source src="rabbit320.mp4" type="video/mp4">
    <source src="rabbit320.webm" type="video/webm">
    <p>Your browser doesn't support HTML5 video. Here is a <a href="rabbi
  </video>

  <div class="controls">
    <button class="playpause">Play</button>
    <button class="stop">Stop</button>
    <button class="rwd">Rwd</button>
    <button class="fwd">Fwd</button>
    <div class="time">00:00</div>
  </div>
</section>
```

JavaScript basic setup

We've inserted some simple control buttons below our video. These controls of course won't do anything by default; to add functionality, we will use JavaScript.

We will first need to store references to each of the controls — add the following to the top of your JavaScript file:

```
var playPauseBtn = document.querySelector('.playpause');
var stopBtn = document.querySelector('.stop');
var rwdBtn = document.querySelector('.rwd');
var fwdBtn = document.querySelector('.fwd');
var timeLabel = document.querySelector('.time');
```

Next, we need to grab a reference to the video/audio player itself — add this line below the previous lines:

```
var player = document.querySelector('video');
```

This holds a reference to a `HTMLMediaElement` object, which has several useful properties and methods available on it that can be used to wire up functionality to our buttons.

Before moving onto creating our button functionality, let's remove the native controls so they don't get in the way of our custom controls. Add the following, again at the bottom of your JavaScript:

```
player.removeAttribute('controls');
```

Doing it this way round rather than just not including the controls attribute in the first place has the advantage that if our JavaScript fails for any reason, the user still has some controls available.

Wiring up our buttons

First, let's set up the play/pause button. We can get this to toggle between play and pause with a simple conditional function, like the following. Add it to your code, at the bottom:

```
playPauseBtn.onclick = function() {
  if(player.paused) {
    player.play();
    playPauseBtn.textContent = 'Pause';
  } else {
    player.pause();
    playPauseBtn.textContent = 'Play';
  }
};
```

Next, add this code to the bottom, which controls the stop button:

```
stopBtn.onclick = function() {
  player.pause();
  player.currentTime = 0;
  playPauseBtn.textContent = 'Play';
};
```

There is no `stop()` function available on `HTMLMediaElement`s, so instead we `pause()` it, and at the same time set the `currentTime` to 0.

Next, our rewind and fast forward buttons — add the following blocks to the bottom of your code:

```
rwdBtn.onclick = function() {
  player.currentTime -= 3;
};

fwdBtn.onclick = function() {
  player.currentTime += 3;
  if(player.currentTime >= player.duration || player.paused) {
    player.pause();
    player.currentTime = 0;
    playPauseBtn.textContent = 'Play';
  }
};
```

These are very simple, just adding or subtracting 3 seconds to the `currentTime` each time they are clicked. In a real video player, you'd probably want a more elaborate seeking bar, or similar.

Note that we also check to see if the `currentTime` is more than the total media `duration`, or if the media is not playing, when the Fwd button is pressed. If either conditions are true, we simply stop the video, to avoid the user interface going wrong if they attempt to fast forward when the video is not playing, or fast forward past the end of the video.

Last of all, add the following to the end of the code, to control the time elapsed display:

```
player.ontimeupdate = function() {
  var minutes = Math.floor(player.currentTime / 60);
  var seconds = Math.floor(player.currentTime - minutes * 60);
  var minuteValue;
  var secondValue;

  if (minutes<10) {
    minuteValue = "0" + minutes;
  } else {
    minuteValue = minutes;
  }

  if (seconds<10) {
    secondValue = "0" + seconds;
  } else {
    secondValue = seconds;
  }

  mediaTime = minuteValue + ":" + secondValue;
  timeLabel.textContent = mediaTime;
};
```

Each time the time updates (once per second), we fire this function. It works out the number of minutes and seconds from the given currentTime value that is just in seconds, adds a leading 0 if either the minute or second value is less than 10, and then create the display readout and adds it to the time label.

Further reading

This gives you a basic idea of how to add custom player functionality to video/audio player instances. For more information on how to add more complex features to video/audio players, including Flash fallbacks for older browsers, see:

- Audio and video delivery
- Video player styling basics
- Creating a cross-browser video player

We've also created an advanced example to show how you could create an object-oriented system that finds every video and audio player on the page (no matter how many there are) and adds our custom controls to it. See custom-controls-oojs (also see the source code).

Audio transcripts

To provide deaf people with access to audio content, you really need to create text transcripts. These can either be included on the same page as the audio in some way, or included on a separate page and linked to.

In terms of actually creating the transcript, your options are:

- Commercial services — You could pay a professional to do the transcription, see for example companies like Scribie, Casting Words, or Rev. Look around and ask advice to make sure you find a reputable company that you'll be able to work with effectively.
- Community/grass roots/self transcription — If you are part of an active community or team in your workplace, then you could ask them for help with doing the translations. You could even have a go at doing them yourself.
- Automated services — There are automated services available, for example when you upload a video to YouTube you can choose to generate automated captions/transcripts. Depending on how clear the spoken audio is, the resulting transcript quality will vary greatly.

As with most things in life, you tend to get what you pay for; different services will vary in accuracy and time taken to produce the transcript. If you pay a reputable company to do the transcription, you will probably get it done rapidly and to a high quality. If you don't want to pay for it, you are likely to get it done at a lower quality, and/or slowly.

It is not OK to publish an audio resource but promise to publish the transcript later on — such promises often aren't kept, which will erode trust between you and your users. If the audio you are presenting is something like a face to face meeting or live spoken performance, it would be acceptable to take notes during the performance, publish them in full along with the audio, then seek help in cleaning up the notes afterwards.

Transcript examples

If you use an automated service, then you'll probably have to use the user interface that the tool provides. For example, take a look at Audio Transcription Sample 1 and choose *More* > *Transcript*.

If you are creating your own user interface to present your audio and associated transcript, you can do it however you like, but it might make sense to include it in a showable/hideable panel; see our audio-transcript-ui example (also see the source code).

Audio descriptions

On occasions where there are visuals accompanying your audio, you'll need to provide audio descriptions of some kind to describe that extra content.

In many cases this will simply take the form of video, in which case you can implement captions using the techniques described in the next section of the article.

However, there are some edge cases. You might for example have an audio recording of a meeting that refers to an accompanying resource such as a spreadsheet or chart. In such cases, you should make sure that the resources are provided along with the audio + transcript, and specifically link to them in the places where they are referred to in the transcript. This of course will help all users, not just people who are deaf.

> **Note**: An audio transcript will in general help multiple user groups. As well as giving deaf users access to the information contained in the audio, think about a user with a low bandwidth connection, who would find downloading the audio inconvenient. Think also about a user in a noisy environment like a pub or bar, who is trying to access the information but can't hear it over the noise.

Video text tracks

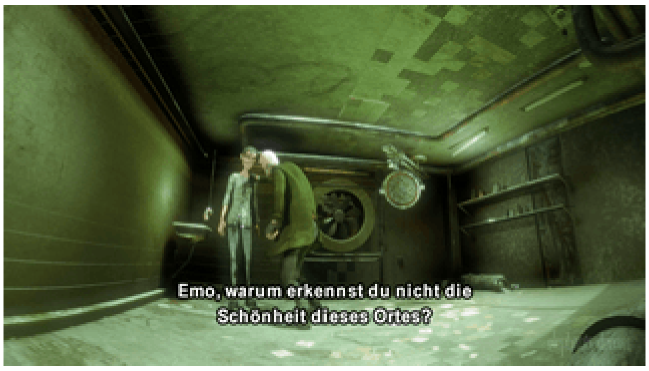
To make video accessible for deaf, blind, or even other groups of users (such as those on low bandwidth, or who don't understand the language the video is recorded in), you need to include text tracks along with your video content.

> **Note**: text tracks are also useful for potentially any user, not just those with disabilities. for example, some users may not be able to hear the audio because they are in noisy environments (like a crowded bar when a sports game is being shown) or might not want to disturb others if they are in a quiet place (like a library.)

This is not a new concept — television services have had closed captioning available for quite a long time:

GOOD WORK, GOLDIE.
KEEP IT UP!

Whereas many countries offer English films with subtitles written in their own native languages, and different language subtitles are often available on DVDs, for example



There are different types of text track with different purposes. The main ones you'll come across are:

- Captions — There for the benefit of deaf users who can't hear the audio track, including the words being spoken, and contextual information such as who spoke the words, if the people were angry or sad, and what mood the music is currently creating.
- Subtitles — Include translations of the audio dialog, for users that don't understand the language being spoken.
- Descriptions — These include descriptions for blind people who can't see the video, for example what the scene looks like.
- Chapter titles — Chapter markers intended to help the user navigate the media resource

Implementing HTML5 video text tracks

Text tracks for displaying with HTML5 video need to be written in WebVTT, a text format containing multiple strings of text along with metadata such as what time in the video you want each text string to be displayed, and even limited styling/positioning information. These text strings are called cues.

A typical WebVTT file will look something like this:

```
WEBVTT

1
00:00:22.230 --> 00:00:24.606
This is the first subtitle.

2
00:00:30.739 --> 00:00:34.074
This is the second.

  ...
```

To get this displayed along with the HTML media playback, you need to:

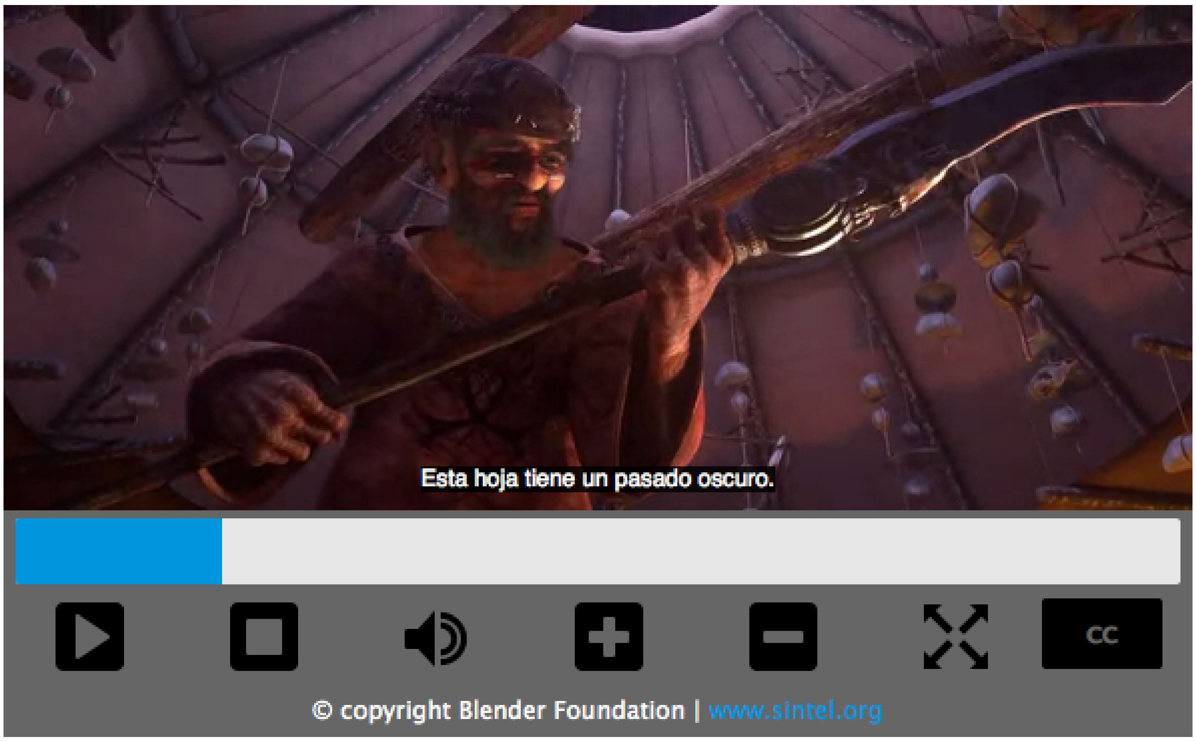
- Save it as a .vtt file in a sensible place.

- Link to the .vtt file with the `<track>` element. `<track>` should be placed within `<audio>` or `<video>`, but after all `<source>` elements. Use the `kind` attribute to specify whether the cues are subtitles, captions, or descriptions. Furthermore, use `srclang` to tell the browser what language you have written the subtitles in.

Here's an example:

```
<video controls>
    <source src="example.mp4" type="video/mp4">
    <source src="example.webm" type="video/webm">
    <track kind="subtitles" src="subtitles_en.vtt" srclang="en">
</video>
```

This will result in a video that has subtitles displayed, kind of like this:


Esta hoja tiene un pasado oscuro.
CC
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For more details, please read Adding captions and subtitles to HTML5 video. You can find the example that goes along with this article on Github, written by Ian Devlin (see the source code too.) This example uses some JavaScript to allow users to choose between different subtitles. Note that to turn the subtitles on, you need to press the "CC" button and select an option — English, Deutsch, or Español.

Note: Text tracks and transcriptions also help you with SEO, since search engines especially thrive on text. Text tracks even allow search engines to link directly to a spot partway through the video.

Other multimedia content

The above sections don't cover all types of multimedia content that you might want to put on a web page. You might also need to deal with games, animations, slideshows, embedded video, and content created using other available technologies such as:

- HTML5 canvas
- Flash
- Silverlight

For such content, you need to deal with accessibility concerns on a case by case basis. In some cases it is not so bad, for example:

- If you are embedding audio content using a plugin technology like Flash or Silverlight, you can probably just provide an audio transcript in the same manner as we already showed above in the Transcript examples section.
- If you are embedding video content using a plugin technology like Flash or Silverlight, you can take advantage of captioning/subtitling techniques available to those technologies. For example, see Flash captions, Using the Flash-Only Player API for Closed Captioning, or Playing Subtitles with Videos in Silverlight.

However, other multimedia is not so easy to make accessible. If for example you are dealing with an immersive 3D game or virtual reality app, it really is quite difficult to provide text alternatives for such an experience, and you might argue that blind users are not really in the target audience bracket for such apps.

You can however make sure that such an app has good enough color contrast and clear presentation so it is perceivable to those with low vision/color blindness, and also make it keyboard accessible. Remember that accessibility is about doing as much as you can, rather than striving for 100% accessibility all the time, which is often impossible.

Summary

This chapter has provided a summary of accessibility concerns for multimedia content, along with some practical solutions.

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