Mobile Devices and the New Media: Trends, Standards, and Development

TECHNICAL SPECIFICATION GUIDE | MEDIA DEVELOPMENT TECHNIQUES FOR E-LEARNING
An introduction to new media prospects on tablet devices

Apple announced the release of its iPhone back in 2007, and the iPad tablet in late January 2010. Both were groundbreaking technological initiatives in mobile computing, and the mobile device concept was born. Based on the study of information technology’s future, it's believed that the adoption and use of iPads and similar mobile devices will grow rapidly in coming years.

Functional significance of this technical specification guide

This Technical Specification Guide will help media designers and developers to learn and adapt the new media standards and technologies efficiently. This guide will also examine the current worldwide focus on media development standards, best practices, and strategies for mobile and tablet devices.

In this document, you will learn about:
- The latest technical details of mobile devices
- New media standards
- How new media is developed for mobile devices such as tablets
Facts about the mobile device and tablet market

Currently, worldwide there are four popular operating systems available on tablets or mobile devices:

- Apple Touch screen API - iPads, iPhones and iPod Touch devices
- Google Android API - Samsung Galaxy Tab, Note, S2, etc.
- BlackBerry’s “Research In Motion” (RIM) API - BlackBerry PlayBook
- Windows Touch Screen API - Nokia Lumia with Windows 7.5 Mango

Now mobile devices are increasingly “always connected” devices, not just through text messages and phone conversations, but also as doorways to content on the Internet. Mobile devices, especially smart phones and tablets, enable “anytime/anywhere” access to information, social networks, tools for learning and productivity, and thousands of web applications designed for all aspects of daily life. New devices can capture multimedia, access the internet, or geo-locate. Tablets and smart phones are used for productivity, education, entertainment, social interaction, and more.

Projections suggest that internet-capable mobile devices will outnumber PCs by 2013. However, the mobile web experience has yet to live up to its full potential as compared to the traditional web experience web developers and designers need to understand practical techniques that will enhance mobile web browsing experience. Designing the content and media for the mobile web is not the same as designing for the traditional web.

The newer technological advancements, media trends, and standards in this field are getting restructured very fast, so we have to learn to adapt quickly to these new changes as well as adjust to market demands.
New strategies for tablets

More and more web users are accessing the web from mobile devices. As a result, a growing number of businesses and organizations are now beginning to develop a mobile strategy, and make their web presence accessible on tablets and smart phones.

With the availability of sophisticated HTML5 development platforms, organizations are now capable of generating mobile applications and web sites with functionality almost identical to native apps. Several content and media strategies can be applied to design tablet-based applications:

- Effective UX design
- Use of rich media
- Simplicity in design
- Adaptive layout approach
- Fluid width design

Effective UX design: To compete in today’s design-savvy marketplace, mobile UX designs not only have to work great, they also have to look great. Beyond that, those looks must enhance the overall mobile experience and create an emotional connection with the user. Too much graphic excitement becomes distracting, and too little makes your interface boring. The best mobile UX design must achieve a balance.

We also suggest incorporating a bit of users’ freedom and flexibility in mobile UX design strategies, because most mobile applications and web sites are intuitive in nature, and offer seamless media animations and interactivities without affecting overall functionality. Examples include interactive mobile applications, games, and books and magazines on tablets.

Use of rich media: Viewing all kinds of multimedia content on a mobile device is common these days, so we should think ahead in terms of applying rich media content and meeting market demands appropriately. On the other hand, rich multimedia content may not be openly accessible on mobile devices or tablets because of internet connectivity and technology limitations—mobile web infrastructure still needs significant improvement. Also note that handheld devices such as tablets provide users with the best screen detail, smart touch navigation, ease of viewing, and management of rich media. The popularity of tablets is growing fast, and the demand to have high-end media content will definitely increase.

Simplicity in design: The great part about the mobile web is its simplicity. In the context of mobile content design, simplicity connects to usability. Keep the design clutter-free, and as lightweight as possible. Maximize the use of screen real estate to provide more, while navigating through a simple and uncluttered interface. Since the traditional keyboard and mouse are not required on tablets, a simple design is critical for users to be able to move around with ease.
Adaptive layout approach: Adaptive or responsive web design is the approach suggesting that design and development should respond to the user’s behavior and environment based on screen size, platform, and orientation. The practice consists of a mix of flexible grids and layouts, images, and an intelligent use of CSS media queries. As the users switch from their laptops to iPads, the website should automatically switch to accommodate for resolution, image size, and scripting abilities. In other words, the website should have the technology to automatically respond to the user’s preferences, eliminating the need for a different design and development phase for each new gadget on the market.

The concept of adaptive or responsive web design is not only about adjustable screen resolutions and automatically resizable images, but also about a whole new way of thinking about design. As we know from the rising popularity of the iPhone, iPad, and advanced smart phones, many new devices are able to switch from portrait to landscape at the user’s whim. Our design strategies should be ready for these situations.

Fluid width design concept: The iPad has no “right” way of viewing websites; you can view websites either in landscape or in portrait mode. But for the designer, this means two completely different layouts to design. It is for this specific reason that the iPad highlights the need for smart fluid width design. Using a smart combination of CSS and JavaScript, the user experience can be made to improve drastically. The iPad has a screen resolution of 1024 x 768, so designing the layout with 960 pixels (or the 960 grid system) should be fine. However, it’s important to note that the iPad can and will show the website in both portrait and landscape modes automatically, so having some fluidity or flexibility is a good idea.
Tablet essentials: The screen, colors, and more

Tablets are a new concept in computer technology. Because they are handheld devices, it would be inappropriate to dismiss them as “mini laptops. They are branded as “slates or tablets” by computer manufacturers, and mainly contain a touch screen in sizes ranging from 5 to 10 inches. Their touch interfaces enable you to watch movies, read email, browse the web, flip through e-books, or play games.

Understanding the tablet screen myths and screen aspect ratio

It is widely believed that the 10.1-inch screens (measured diagonally) of Android tablets are larger than the 9.7-inch iPad screens, but they are actually 5 percent smaller than the iPad in terms of the image area of the screen. This is due to both aspect ratio geometry (the screen area decreases as the aspect ratio increases) and the Android system bar, which reduces the image area.

The shapes of the tablet screens are also significantly different. The iPad has an aspect ratio of 4:3 = 1.33 (the ratio of width to height) and the Android tablets all have an aspect ratio of 16:10 = 1.60. But because of the Android system bar, the aspect ratio of the image area is larger—1.70—which is rather close to the HDTV 16:9 aspect ratio of 1.78. Therefore, Android tablets are very well suited for watching widescreen videos in landscape mode. They are generally considered too narrow to be useful in portrait mode, however.

On the other hand, the iPad—instead of having a widescreen—has an aspect ratio very close to the standard 8.5 x 11-inch paper, so it is naturally suited for reading a lot of content in portrait mode. In many cases, it is also better for reading content in landscape mode. Because the iPad’s image height is 5.8 inches, and the Android tablets have an image height of only 5.0 inches, you can read more on the iPad before you need to scroll. For watching 16:9 widescreen videos however, the iPad image height is only 4.4 inches—smaller than the Android height of 4.8 inches for 16:9 widescreen videos. The best screen shape will really depend on your intended mix of applications.

Optimizing visuals for high pixel density displays on mobile devices

Recent mobile device releases have raised the bar in terms of display pixel density. The iPhone 4 326 PPI ‘retina display’ is getting a lot of well-deserved attention in this respect. That’s because the retina display’s pixel density is so high that your eye is unable to distinguish individual pixels. This means that text in books, web pages, and email is crisp at any size. Images in games, movies, and photos pop off the screen, and everything is sharper. This trend and the concurrent surge in tablet popularity means we’re now designing for an extremely wide range of display specifications, so high pixel density tablets are becoming the reality.
### Display-Related Information for Popular Tablets and Mobile Devices

<table>
<thead>
<tr>
<th>Categories</th>
<th>Apple - iPad2</th>
<th>Samsung Galaxy Tab</th>
<th>Motorola Xoom</th>
<th>Asus Transformer</th>
<th>Tester’s Comments</th>
<th>Useful media-related understanding</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS Version for the Tests</td>
<td>iOS 4.3</td>
<td>Android 3.1</td>
<td>Android 3.1</td>
<td>Android 3.1</td>
<td>The current OS versions available during testing.</td>
<td>Operating System (OS) is one of the most important features of tablets in the market. Media focus will depend a lot on this aspect.</td>
</tr>
<tr>
<td>Display Technology</td>
<td>9.7 inch IPS LCD</td>
<td>10.1 inch PLS LCD</td>
<td>10.1 inch LCD</td>
<td>10.1 inch IPS LCD</td>
<td>LCD – Liquid Crystal Display IPS - In Plane Switching PLS - Plane to Line Switching</td>
<td>Most tablets do have a common screen size (well almost), so media display area also remains almost the same on all tablets.</td>
</tr>
<tr>
<td>Screen Shape</td>
<td>4:3 = 1.33 Aspect Ratio</td>
<td>16:10 = 1.60 Aspect Ratio</td>
<td>16:10 = 1.60 Aspect Ratio</td>
<td>16:10 = 1.60 Aspect Ratio</td>
<td>The iPad screen has the same shape as 8.5x11 paper and Android Tablets have an active screen similar to HDTVs.</td>
<td>Screen aspect ratio definitely changes the viewing ease of HD movies/images with 16:9 ratios. But it also plays perfectly fine on an iPad.</td>
</tr>
<tr>
<td>Display Resolution</td>
<td>1024 x 768 pixels</td>
<td>1280 x 800 pixels</td>
<td>1280 x 800 pixels</td>
<td>1280 x 752 active</td>
<td>The more pixels and sub-pixels, the better. Android 3.1 tablets reserve 48 pixels for buttons and status.</td>
<td>Screen resolution of an iPad is low but it doesn’t affect much, hopefully, the next version of iPads will get it fixed.</td>
</tr>
<tr>
<td>Pixels Per Inch (PPI)</td>
<td>132 ppi Good</td>
<td>149 ppi Good</td>
<td>149 ppi Good</td>
<td>149 ppi Good</td>
<td>At 12 inches from the screen, 20/20 vision is 286 ppi. Best human vision is about 20/10 vision, or 572 ppi.</td>
<td>The recent release of iPhone 4 with 326 PPI Retina Display is the beginning of Apple’s strategy on PPI usage on all mobile devices. (Please check the discussion above.)</td>
</tr>
<tr>
<td>Display Color Depth</td>
<td>Full 24-bit color 256 Intensity Levels No dithering</td>
<td>Full 24-bit color 256 Intensity Levels No dithering</td>
<td>Full 24-bit color 256 Intensity Levels No dithering</td>
<td>18-bit color with dithering to 24-bit color</td>
<td>24-bit displays produce images with relatively smooth and artifact-free colors and intensities.</td>
<td>24-bit display color is the lowest standard now on all display devices worldwide, so greater display depth is equal to better color output results for any kind of media on the screen.</td>
</tr>
<tr>
<td>Photo Viewer Color Depth</td>
<td>Full 24-bit color No dithering</td>
<td>Full 24-bit color No dithering</td>
<td>16-bit color with poor dithering to 24-bit color</td>
<td>16-bit color with poor dithering to 24-bit color</td>
<td>Android 3.1 continues with a poor Gallery viewer that provides 16-bit color with poorly implemented dithering. The Galaxy Tab overwrites 16-bit images with 24-bit color.</td>
<td>This Photo Viewer Color Depth comparison clearly makes Apple mobile devices stand out in the tablet market worldwide.</td>
</tr>
</tbody>
</table>

Reference: [http://www.displaymate.com/Tablet_ShootOut_2.htm](http://www.displaymate.com/Tablet_ShootOut_2.htm)
Media standards for tablets and mobile devices

The primary media standards for mobile devices (mainly tablets) are categorized as fonts, images, videos, and audio.

Font and typography standards

Today, everything that type can do on a personal computer, on the web, or in print, can also be done on mobile devices. Typefaces can bring drama and emotion to games and theme-based applications, and hierarchy to user interfaces. Type can complement multimedia effects and take the mobile experience to a new level.

Apple iOS Mobile Devices: Apple's iPhone and iPad use 58 fonts (http://iosfonts.com/). Tablets like iPad support web fonts, but when they run Mobile Safari, only SVG fonts are supported. Similarly, Embedded Open Type (EOT) fonts supported for Internet Explorer, TTF/OTF for Safari and Opera, WOFF for Firefox 3.6, and now SVG fonts for Mobile Safari.

Android Mobile Devices: Every Android device comes with a collection of three standard fonts: Droid Sans, Droid Sans Mono, and Droid Serif, which are known as the Droid family of fonts. They were designed to be optimal for mobile displays, but can be customized further.

Today, the typography options on mobile devices or mobile browsers move closer to their desktop cousins in all respects. Typography for tablets may not have hard rules, but do require certain guidelines. Using proper contrast, size, hierarchy, and space makes the typography interesting, similar to designing for any other web page.

Browser fonts

EOT fonts: Embedded OpenType (.eot) is a font format similar to TrueType, but with modifications for use on web sites. EOT allows web fonts to be bound to a specific domain, so they are protected against use on a different server. EOT fonts can also use sub setting and be compressed so that the size of the font file is reduced.

Raw fonts: When fonts in the TrueType (.ttf) or OpenType (.ttf/.otf) format are directly linked in web pages, they are usually referred to as “raw fonts,” because they were not converted into a web font format. The possibility of using raw fonts was first introduced in Safari 3.1 in 2008—later Firefox and Opera followed. Commercial fonts usually can’t be used as raw fonts on web sites because of license restrictions.

WOFF: Web Open Font Format (WOFF) is a font format based on the sfnt file structure (used in TrueType and OpenType fonts) and specifically designed for web use with the @font-face declaration. It was developed by Mozilla Corporation and few others. A WOFF font is a repackaged version of a TrueType or OpenType font in a compressed form. The font format also allows metadata and private-use data to be included separately from the font data.

SVG: SVG fonts are text files that contain the graphic symbol or a small picture, e.g., on an icon, with their outlines represented as standard SVG elements and attributes, as if they were single vector objects in the SVG image.
Media standards for images and objects

<table>
<thead>
<tr>
<th>iOS image formats</th>
<th>Android image formats</th>
<th>Blackberry (RIM) image formats</th>
</tr>
</thead>
<tbody>
<tr>
<td>JPEG (.jpg)</td>
<td>JPEG (.jpg)</td>
<td>JPEG (.jpg)</td>
</tr>
<tr>
<td>GIF (.gif)</td>
<td>GIF (.gif)</td>
<td>GIF (.gif)</td>
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<tr>
<td>PNG (.png)</td>
<td>PNG (.png)</td>
<td>PNG (.png)</td>
</tr>
<tr>
<td>BMP (.bmp)</td>
<td>BMP (.bmp)</td>
<td>BMP (.bmp)</td>
</tr>
<tr>
<td>TIFF (.tiff)</td>
<td>WebP (.webp)</td>
<td></td>
</tr>
<tr>
<td>SVG (.svg)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tech Specs: Image formats used in these three tablets

The desktop web is rich with a variety of embedded content; however, due to hardware limitations of many tablet devices, you cannot assume that all devices have the same capabilities.

Media standards for animation and videos

<table>
<thead>
<tr>
<th>iOS animation/video formats</th>
<th>Android animation/video formats</th>
<th>Blackberry (RIM) animation/video formats</th>
</tr>
</thead>
<tbody>
<tr>
<td>H.264 video up to 1080p, 30 frames per second</td>
<td>H.263 • 3GPP (.3gp) • MPEG-4 (.mp4) H.264 AVC • 3GPP (.3gp) • MPEG-4 (.mp4) • MPEG-TS (.ts, AAC audio only, not seek able, Android 3.0+)</td>
<td>3GP 3GP2 M4A M4V MOV MP4 MPEG-4 Codec - H.264 Codec - MPEG-4</td>
</tr>
<tr>
<td>MPEG-4 video up to 2.5 Mbps, 640 by 480 pixels, 30 frames per second</td>
<td>MPEG-4 SP • 3GPP (.3gp) VP8 • WebM (.webm) • Matroska (.mkv, Android 4.0+)</td>
<td>AVI Codec - MPEG-4 Codec - H.264 Codec - Xvid® ASF (Advanced Systems Format by Microsoft) WMV WMA Codec - VC-1 F4V (Flash Video) Codec - VP6 Codec - Sorenson Spark®</td>
</tr>
<tr>
<td>Motion JPEG (M-JPEG) up to 35 Mbps, 1280 by 720 pixels, 30 frames per second</td>
<td>Source: <a href="http://developer.android.com/guide/appen-dix/media-formats.html">http://developer.android.com/guide/appen-dix/media-formats.html</a></td>
<td>Source: Supported_MediaTYPES_on_BlackBerry_Tables_ (English).pdf</td>
</tr>
</tbody>
</table>

Tech Specs: Animation and video formats used in these three tablets

Essential tips for designers

Font & typography: The best font for any mobile device and any application should have the following attributes and design qualities:

- Open counters (White space between letters)
- Adequate lowercase x height
- Reasonable contrast in stroke thickness
- Distinguishing character shapes
- Marked difference between bold and medium weights of the same type family

Images and objects: Nearly all mobile devices support the JPEG, GIF, and PNG formats. Both 8-bit PNG and 24-bit PNG with alpha transparency are supposed to be supported as of WAP 2.0, but some older devices may not support these due to hardware limitations. Whenever possible, use PNGs, as they are the recommended image format for the mobile web as well as tablets.

Animation and videos: Aspect ratio refers to the ratio of the width of the image to the height of the image, as shown on the screen. There are three common aspect ratios in use for commercial video content today:

- 4:3 used for almost all standard definition TV broadcast content
- 16:9 used for almost all high-definition TV content (HDTV) and many theatrical DVD releases
- 2.35:1 or 21:9 used for “Cinemascope” or “Panavision” movies on DVD

Source: Supported_MediaTYPES_on_BlackBerry_Tables_ (English).pdf
Important animation and video information

It's widely known that the higher the video resolution and bit rate, the better the quality of the resulting video. Here, H.264 and MPEG-4 codecs do an efficient job of producing high-quality videos at lower bit rates.

Understanding the latest animation and video formats/codecs is important. Until a couple of years ago, when animation development required very sophisticated formats, the only option was to use Flash. Now, things have changed, and a key indicator of this change is the fact that Apple has now sold an extremely large number of iPhones and iPads, none of which support Flash. Luckily, multiple techniques are now available through the HTML5 standard and CSS3 techniques.

Video encoding: There are plenty of popular video conversion tools that are available for encoding video content onto the iPad or any other tablet; however, using a tested and proven method is better. Apple's iPod, iPhone, Apple TV, and the new iPad play back videos encoded using either the MPEG-4 or H.264 codecs. These are open-standard video formats, and not in any way proprietary to Apple, but they remain a very popular around the web. Other tablets also prefer to use the same codecs, but Android and RIM by design play more video formats. HTML5 has some restrictions on playing all video formats, however refer to the note in the right column.

Finding Flash and mobile device connections: Now, Flash Player 10.1 is available for a broad range of Android 2.2 mobile devices, including smart phones, netbooks, and other internet-connected devices, allowing your content to reach your customers wherever they are. To make it possible to deploy SWF content on Android smart phones and other mobile devices that have limited processing power and memory availability compared to PCs, a tremendous amount of work has gone into making Flash Player 10.1 “ready for mobility.” This work includes performance improvements, such as rendering, scripting, memory, startup time, battery and CPU optimizations, in addition to hardware acceleration of graphics and video.

It is also known that FLV, or Flash Video, format normally plays only on PDA-based Windows Mobile and PalmOS-based smart phones. Versions of Android above 2.1 support Flash, unlike Apple's iOS. FLV movies play through Flash Media Server 4.5, which allows Flash video streaming to iPhones and iPads. It achieves this by delivering the content in an MPEG-2 stream using the HTTP Live Streaming format.

H.264 and Ogg Theora, both codecs are supported by the current version of HTML5.

H.264 (.mp4)
The H.264 codec is a video compression standard developed and governed by the MPEG Licensing Association (MPEG LA), which is a partnership between the ITU-T Video Coding Experts Group (VC EG) and the ISO/IEC Moving Picture Experts Group (MPEG). The H.264 codec is used across many applications, from compressed video for internet streaming applications to HDTV broadcast and digital cinema applications. H.264 is also one of the compression standards used in Blu-ray Disc format. Google, YouTube, Vimeo, and Apple have all announced their support for the H.264 standard.

One of the key issues regarding the H.264 is licensing. In August 2010, MPEG LA announced that they will not charge a royalty fee for videos encoded using H.264, provided that the videos are free to the end user until at least 2016. This is really good news for supporters of H.264.

Ogg Theora (.ogg)
The Theora codec is a video compression framework developed by the Xiph.Org Foundation. The mission of the Xiph.Org Foundation is to protect the foundations of internet multimedia from control by private interests. All of the foundation's projects support open standards and are license-free. Ogg is the media container that delivers videos, and was also developed by the Xiph.Org Foundation (an open source community). In addition, both Mozilla and Opera Software support the Ogg Theora video format.
Notes on HTML5 and CSS3

- All Apple mobile devices and Mac (along with the latest version of Apple’s Safari web browser) support web standards, including HTML5, CSS3 (Cascading Style Sheets), and JavaScript. These web standards are open, reliable, highly secure, and efficient. They allow web designers and developers to create advanced graphics, typography, animation, and transitions.

- The audio and visual support in HTML5 is exceptional. It is easy to add audio and video to websites without the need for external plugins (but not all browsers support all audio and videos).

- Mobile phone applications will be much more accessible if written in HTML5 because we will not have to write applications for a specific brand of phone, rather we can create universal applications for all phones.

- HTML5 and CSS3 together will give us some serious designer credibility.

- CSS3 offers some exciting new features to enhance the appearance of a website. It offers increased flexibility in the presentation of website content. In essence, it just makes everything prettier. Although CSS3 isn’t supported by all browsers yet, but it’s becoming increasingly popular among web designers because of its easy design flexibility.


Media standards for audio usage

<table>
<thead>
<tr>
<th>iOS audio formats</th>
<th>Android audio formats</th>
<th>Blackberry (RIM) audio formats</th>
</tr>
</thead>
<tbody>
<tr>
<td>• HE-AAC (V1 and V2)</td>
<td>• AAC LC/LTP</td>
<td>• AAC</td>
</tr>
<tr>
<td>• AAC (8 to 320 Kbps)</td>
<td>• HE-AACv1 (AAC+)</td>
<td>• MP3</td>
</tr>
<tr>
<td>• Protected AAC (from iTunes Store)</td>
<td>• HE-AACv2 (enhanced AAC+) (Formats .3gp, .mp4, .m4a, .aac, .ts)</td>
<td>• PCM</td>
</tr>
<tr>
<td>• MP3 (8 to 320 Kbps)</td>
<td>• AMR-NB (.3gp)</td>
<td>• WAV</td>
</tr>
<tr>
<td>• MP3 VBR</td>
<td>• AMR-WB (.3gp)</td>
<td></td>
</tr>
<tr>
<td>• Audible (formats 2, 3, &amp; 4, Audible Enhanced Audio, AAX, and AAX+), Apple Lossless, AIFF, and WAV</td>
<td>• FLAC (.flac)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• MP3 (.mp3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• MIDI (.mid, .xmf, .mxmf)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Vorbis (.ogg)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• PCM/WAVE (.wav)</td>
<td></td>
</tr>
</tbody>
</table>

Tech Specs: Audio formats used in these three tablets

In the case of HTML audio, many browsers do not always support all common audio formats. For example, the Firefox browser for Android supports only ogg and wav files, while Safari on iOS does not support ogg. In these cases, all common browsers would need to provide sound in at least two different formats: Ogg in order to work in Firefox, and a different format to work in Safari.

Factsheet of supported audio formats in popular mobile browsers

<table>
<thead>
<tr>
<th>Audio formats</th>
<th>Android browsers</th>
<th>Safari (iOS)</th>
<th>Firefox for Android</th>
<th>Opera Mobile for Android</th>
</tr>
</thead>
<tbody>
<tr>
<td>wav</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>mp3</td>
<td>yes</td>
<td>yes</td>
<td>x</td>
<td>yes</td>
</tr>
<tr>
<td>mp4 (m4a)</td>
<td>yes</td>
<td>yes</td>
<td>x</td>
<td>yes</td>
</tr>
<tr>
<td>3gp (aac)</td>
<td>yes</td>
<td>yes</td>
<td>x</td>
<td>yes</td>
</tr>
<tr>
<td>ogg</td>
<td>yes</td>
<td>x</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>amr</td>
<td>yes</td>
<td>yes</td>
<td>x</td>
<td>yes</td>
</tr>
</tbody>
</table>
Case Study: Discovering the new media development techniques for tablets

In the mobile world, the canvas may be as small as your palm, but it still has a lot to say. To achieve maximum impact on the small screen, the key lies in user interface design. Once that is locked down, it's simply a case of optimizing the graphics for various device platforms. Personal computers and tablets utilize the same logic.

Topic for the case study discussion: ‘Expository Writing’ - The NIIT ELS - K12 team created two creative e-learning demos for a reputed publisher in July of 2011. These were aimed mainly at tablet devices, because the client wanted them to be future-ready. The HTML5-based demos were designed to play seamlessly on iPads, Android tablets, and a few desktop web browsers.

Introduction to an e-learning course development process: The diagram below explains the unique e-learning development activity cycle, which will help us to understand the different development stages, and plan our actions. It’s also known that most e-learning programs are divided into several learning modules. Each module needs to have minimum two or more activities, which helps in making the learning system more interactive and engaging.

Case Study: Learning design and objectives

(Based on media and technical development requirements only)

Task: Create a sample course for a digital Grade 2 language arts lesson (7-8-year-olds) for the U.S. educational market. This should be a web-based e-learning application, not an app.

Design strategy: Media and technical developments should be made using only Adobe Flash, After Effects, and HTML5.

Note: Flash animation later would be converted into MP4 video format (with H264 codec) to run on the HTML5 environment. HTML5 remains the base course design architecture here.
The solution: Media development steps and standards

A note for media developers: In the beginning, media creation for the HTML5 environment required experiments and conceptualization; this is because the most conventional and useful way of creating animated media is still currently Adobe Flash. Our base HTML5 environment for iPads and other mobile devices does not support Flash, however. This successful detailed media development strategy as explained below will hopefully help all project owners to plan future tablet-based media developments.

Step 1 | Visualization and storyboarding

After finalizing the storyboard or script, the media team and instructional designers visualize the entire course frame-by-frame, on paper or digitally. Then, they identify the media strategy and approach, and study various characters, their scenarios, actions, and expressions. This process is called character visualization and storyboarding.
Step 2 | Character creation stage

Graphic designers and animators begin creating the actual character models, and their poses and body parts, in Adobe Flash CS5, vector-based 2D design and animation software.

Sample character creation in Flash (vector) by the animator/graphic designer

Step 3 | Visual compositions of frame animation

After all the characters are digitally created and finalized, the stage is set for animation creation. Typically, the course frame animation phase begins with this step. Designers or animators start this phase with various background layouts and other element designs, which is a requirement of the elaborate animation techniques in Flash animator.

There are various ways of composing Flash animation with various backgrounds, characters, and elements, but a well-managed animation process is preferable for easy maintenance of the source files.
Step 4 | Expressions and visual communication

All effective animation seems dry in the absence of expressions and drama. In this stage, designers and animators begin working on adding expression details to the animation. The expressions are mainly shown with facial and body postures and gestures.

Step 5 | On-screen text and typography usage

Both on-screen text and typography play a major role in portraying comfortable and readable layouts on animated frames. OST (on-screen text) could be added for many reasons, i.e., as supportive text, transcript text, interactive layouts, or instruction text.

Interactive screen design strategy on HTML5 platform (non-Flash environment):

The image below shows one of the HTML5-based interactive pages of this e-learning course. The layout uses text and some interactive elements to check the progress of learning periodically. Design strategies used here are as follows:

• Interactive page design is possible in the HTML5 environment, where no Flash-based interactive coding is needed or used, but knowledge of HTML5 coding is required.
• As for the media, only one background layout and few transparent images (.png) were used to make this interactive screen with HTML5 options.
• A small-sized MP4 video (with VO) was also used to give animated instructions.
• All text visible on this screen is actually an image, but not from any XML/HTML source; however, designing with HTML text and animated GIF or static PNG is possible in the HTML5 platform.
Step 6 | VO and SFX association with the animation

Audio voiceover (VO) and SFX play a major role in moving animation to a level of audio-visual completeness. Without this, the animation cannot be considered ready, as audio is always synced on the animation timeline.

Step 7 | Publishing Flash animation standards

Designers should follow Flash animation publishing standards to check the quality of their animation output. The standards we followed are summarized with this screen shot:
Step 8 | Flash to MP4 video export standards

To run the e-learning course on tablet devices or iPads, Flash-based output (.swf) was not considered as part of the media strategy. We exported the Flash animation or Flash movies as QuickTime movies from Flash, and then converted the QuickTime movies into MP4 movies as the final output.

Note: To ensure successful conversion of Flash animation to a QuickTime movie, we must check for the following:

- The Flash animation should not contain any 'action scripting'
- No layer should be in guide mode
- All the unwanted layers should be deleted (removing unwanted symbols also helps)

Activity 1: Flash to QuickTime:
The Flash and QuickTime export settings are as follows:
Activity 2: QuickTime to MP4:
The QuickTime to MP4 export settings are as follows

Note: You will need to use the original version (not the freeware) of QuickTime Player Pro to export the MP4 video file from the MOV file:
Step 9 | The final output of the movie on iPad and tablets

The raster-based video output from Flash animation looks almost the same as vector-based Flash animation on iPad. Remember, all of these types of movies played on tablets supported by HTML5 have a default media controller to navigate the movie properly, and the media controller skin changes according to the browsers or tablets the movies run on.

Observations from this case study

Here are some important Flash VS HTML5 media strategy outcomes of this Tablet based e-learning course development process. This Case Study outcome completely supports both the strategies effectively.

1. Media effort and solution: The process of creating these complex 2D cell-type animations in Flash technology, and then converting those into MP4 video output, has no major impact on the media development effort. In fact, both Flash and HTML5 technology remains the common media development process successfully.

2. Interactivities: The HTML5-based interactivities and interactive animation effects are not as smooth as in Flash, and require complete programming-based controls to get the required effects.

3. Responsive layout: Fluidic or responsive content and image layout compositions were not experimented in this course design; it used only the horizontal layout.

4. The constraints: Media designers may excel in designs using Flash, but coding with media assets in the HTML5 environment will require some training and practice to enable skill enhancement in this area. Moreover, there is very little newly developed media software available in the market for creating multimedia content easily for tablets and mobile devices.

5. Reactions from the actual user: Most users were very excited and happy about the experience of navigating an e-learning course on an iPad. The smooth multimedia animation and visuals look quite different on iPad than on a desktop or a laptop. The user experience in this experiment is very significant.
The content of this Technical Specification Guide includes web excerpts. This Technical Specification Guide aims to examine the current worldwide focus on media development strategies for mobile devices (mainly tablets); however, given the ongoing technological advancements in this field, this Technical Specification Guide will be updated from time to time.