Understanding Critical Elements of E-books: Standards for Formatting and Metadata

Part 1: EPUB3: Putting Electronic Books into a Package

March 14, 2012

Speakers:
Bill Kasdorf and Sanders Kleinfeld
EPUB 3: Overview, Evolution, and Benefits

Bill Kasdorf
Vice President, Apex Content Solutions
General Editor, The Columbia Guide to Digital Publishing
Metadata Subgroup Lead, IDPF EPUB 3 Working Group
EPUB 3 is a milestone in the evolution of digital publishing.
A milestone marks a spot along the way.
A milestone marks a spot along the way. There's a lot of road stretching behind it and ahead of it.
A brief trip down eBook Memory Lane
The Evolution of eBooks

Electronic books have been around almost as long as computers have.

- **1960s & ’70s:** Experiments on mainframes
- **1980s:** Actual products—CD ROMs
- **1990s:** The first wave of dedicated eReaders
The turn of the millennium: We’re building a Tower of Babel.
IDPF to the Rescue!

Developing an open standard with broad industry participation

- **1999: OEB**
  (the Open eBook standard)

- **2007: EPUB**
  (+ the *non-EPUB* Kindle . . .)

- **2010: EPUB 2.0.1**
  (+ the *EPUB-based* iPad/iBooks)
EPUB 2.0.1 works for books like this . . .
... but not for complex publications like these.
The Mandate for EPUB 3

- Based on open standards, royalty free
- Support all types of publications
- Enable multimedia and interactivity
- Global language support
- Accessibility
- Sophisticated design, layout, typography
- Backwards compatible with EPUB 2.0.1
- Extensible, modular architecture
The EPUB 3 WG was a broad, diverse group of publishers, retailers, & technologists working for the common good.
EPUB 3 Technologies

- **HTML5**—The XML serialization as **XHTML**
- **CSS3**—A defined profile as **EPUB style sheets**
- **SVG**—Can be content docs, not just images
- **JavaScript** as used in **HTML5**
- **Dublin Core** for metadata
- **MathML** (the presentational aspects)
- **OpenType** and **WOFF** fonts
- **Media Overlays** to synchronize text and audio
Features and Benefits of EPUB 3

- Multicolumn layout, typographic control
Features and Benefits of EPUB 3

- Multicolumn layout, typographic control
- Video, audio, animations, interactivity
Features and Benefits of EPUB 3

- Multicolumn layout, typographic control
- Video, audio, animations, interactivity
- Multiple style sheets and Media Queries
Features and Benefits of EPUB 3

- Multicolumn layout, typographic control
- Video, audio, animations, interactivity
- Multiple style sheets and Media Queries
- Vertical writing, Ruby
Features and Benefits of EPUB 3

- Multicolumn layout, typographic control
- Video, audio, animations, interactivity
- Multiple style sheets and Media Queries
- Vertical writing, Ruby
- Expanded metadata; ONIX and MARC
Features and Benefits of EPUB 3

- Multicolumn layout, typographic control
- Video, audio, animations, interactivity
- Multiple style sheets and Media Queries
- Vertical writing, Ruby
- Expanded metadata; ONIX and MARC
- Link to streaming audio and video
Features and Benefits of EPUB 3

- Multicolumn layout, typographic control
- Video, audio, animations, interactivity
- Multiple style sheets and Media Queries
- Vertical writing, Ruby
- Expanded metadata; ONIX and MARC
- Link to streaming audio and video
- CFI (Canonical Fragment Identifier)
Features and Benefits of EPUB 3

- Multicolumn layout, typographic control
- Video, audio, animations, interactivity
- Multiple style sheets and Media Queries
- Vertical writing, Ruby
- Expanded metadata; ONIX and MARC
- Link to streaming audio and video
- CFI (Canonical Fragment Identifier)
- Text-to-speech (PLS, SSML, CSS Speech)
But wait . . . does this actually work anywhere yet?
EPUB 3 was designed to get ahead of reading system developers.
Creating publications conforming to the EPUB 3 spec is the safest and most practical course in any case.
Other Standards Align with EPUB 3

- **DAISY:** EPUB 3 will be the recommended delivery format for accessible content

- **nextPub:** The PRISM Source Vocabulary (PSV) was developed to align with EPUB 3 for content delivery
Working to Encourage Adoption

- **Readium**
  Implementing all EPUB 3 features in WebKit, the leading open-source rendering engine

- **EPUBCheck 3.0**
  Open source validator of EPUB 3 documents

- **EPUB 3.0 Samples Project**
  Collection of model EPUB 3 files showing how EPUB 3 is implemented in various publications
Next Steps: 4 New Working Groups

- **Fixed Layout**
  Metadata to facilitate fixed layout publications

- **Advanced Adaptive Layout**
  Enabling EPUBs to change layout based on screen

- **Indexes**
  Enabling back-of-book index functionality

- **Dictionaries**
  Providing for specialized dictionaries & glossaries
For Further Information

Go to http://idpf.org/epub/30 for

- Overview
- EPUB 3 Changes from EPUB 2.0
- Publications 3.0
- Content Documents 3.0
- OCF 3.0
- Media Overlays 3.0
- Structured Semantics Vocabulary
Thanks!

Bill Kasdorf
bkasdorf@apexcovantage.com
+1 734 904 6252
@BillKasdorf
Adding Interactivity to Ebooks with HTML5

Sanders Kleinfeld
Ebook Production = Developing Content for a Multitude of Screens…

**Example 8-7: Owls of Different Sizes**

In this example, we’ve added two parameters to change the gray value and size of each owl.

```java
void draw() { 
  background(204); 
  for (int x = 35; x < width + 70; x += 70) { 
    owl(x, 110); 
  }
}
```

// Insert owl() function from Example 8-5

It’s possible to keep adding more and more parameters to the function to change different aspects of how the owl is drawn. Values could be passed in to change the owl’s color, rotation, scale, or the diameter of its eyes.

```java
void setup() { 
  size(480, 120); 
  smooth(); 
}

void draw() { 
  background(204); 
  // Insert code for drawing owls
}
```

**Example 8-7: Owls of Different Sizes**

In this example, we’ve added two parameters to change the gray value and size of each owl:

```java
void setup() { 
  size(480, 120); 
  smooth(); 
}

void draw() { 
  background(204); 
  for (int x = 35; x < width + 70; x += 70) { 
    owl(x, 110); 
  }
  // Insert owl() function from Example 8-5

  // Example 8-7: Owls of Different Sizes
  // In this example, we’ve added two parameters to change the gray value and size of each owl:
  void draw() { 
    background(204); 
    for (int x = 35; x < width + 70; x += 70) { 
      owl(x, 110); 
    }
  }

  // Insert code for drawing owls
}
```
...Via many formats, technologies, and software tools

EPUB 2.0.1

CSS

Mobi
epubpreflight
regex
.iba
.oXygen

fixed layout

KF8

JS

epubcheck

KP8

OPF

sigil

EPUB 3

kindlegen

XSL

masochism
HTML5: New elements
(http://www.w3.org/TR/html5-diff/#new-elements)

Navigation:
<article>
<aside>
<header>
<hgroup>
<footer>
<figure>
<figcaption>
<nav>
<section>

Multimedia/Interactivity:
<audio>
<canvas>
<embed>
<source>
<track>
<video>
HTML5: New elements (continued)

(http://www.w3.org/TR/html5-diff/#new-elements)

New `<input>` types:
  - color
  - date
  - datetime
  - datetime-local
  - email
  - month
  - number
  - range
  - search
  - tel
  - time
  - url
  - week

Miscellaneous:
  - `<bdi>`
  - `<command>`
  - `<datalist>`
  - `<details>`
  - `<keygen>`
  - `<mark>`
  - `<meter>`
  - `<output>`
  - `<progress>`
  - `<summary>`
  - `<rp>`
  - `<rt>`
  - `<ruby>`
  - `<time>`
  - `<wbr>`
What is HTML5, really?

A constellation of technologies
When people say "HTML5," they're usually referring to...

...next-generation web sites that include one or more of the following:

- Embedded audio/video media without resorting to Flash or other plugins
- Native interactivity/animation/games without resorting to Flash or other plugins
- Geolocation functionality
- Sites with local storage that you can download and run offline
- Fancy CSS3: columns, text shadows, animations...
- Native support for MathML and SVG
- Semantic markup
HTML5 in Action on the Web
Why should publishers care about HTML5?
HTML5 is the Backbone of the EPUB 3 Standard

The EPUB 3.0 specification for ebooks mandates that content documents use XHTML (HTML5) syntax: http://idpf.org/epub/30/spec/epub30-contentdocs.html#sec-xhtml

While most major ereaders do not formally support EPUB 3, many HTML5 features are currently supported by the following platforms:

- iBooks for iPad, iPhone, iPod
- NOOK Color/Tablet
- Kindle Fire
- Kindle Apps (iPhone/iPad/Android/etc.)
- Safari Books Online
HTML5 in action in ebooks
Canvas allows you to embed a dynamic sketchpad in your content:

```
<canvas id="my_first_canvas" width="200" height="225">
  The content you put here will show up if your rendering engine doesn't support the &lt;canvas&gt; element.
</canvas>
```
You draw on the `<canvas>` with JavaScript

my_canvas.strokeRect(0,0,200,225) // to start, draw a border around the canvas

//draw face
my_canvas.beginPath();
my_canvas.arc(100, 100, 75, (Math.PI/180)*0, (Math.PI/180)*360, false); // circle dimensions
my_canvas.strokeStyle = "black"; // circle outline is black
my_canvas.lineWidth = 3; // outline is three pixels wide
my_canvas.fillStyle = "yellow"; // fill circle with yellow
my_canvas.stroke(); // draw circle
my_canvas.fill(); // fill in circle
my_canvas.closePath();

// now, draw left eye
my_canvas.fillStyle = "black"; // switch to black for the fill
my_canvas.beginPath();
my_canvas.arc(65, 70, 10, (Math.PI/180)*0, (Math.PI/180)*360, false); // circle dimensions
my_canvas.stroke(); // draw circle
my_canvas.fill(); // fill in circle
my_canvas.closePath();

// now, draw right eye
my_canvas.beginPath();
my_canvas.arc(135, 70, 10, (Math.PI/180)*0, (Math.PI/180)*360, false); // circle dimensions
my_canvas.stroke(); // draw circle
my_canvas.fill(); // fill in circle
my_canvas.closePath();

// draw smile
my_canvas.lineWidth = 6; // switch to six pixels wide for outline
my_canvas.beginPath();
my_canvas.arc(99, 120, 35, (Math.PI/180)*0, (Math.PI/180)*-180, false); // semicircle dimensions
my_canvas.stroke();
my_canvas.closePath();

// Smiley Speaks!
my_canvas.fillStyle = "black"; // switch to black for text fill
my_canvas.font = '20px _sans'; // use 20 pixel sans serif font
my_canvas.fillText("Hello Canvas!", 45, 200); // write text
The result...
But Canvas is all about interactivity...

You can dynamically update what's displayed on the canvas in real time, and in response to user input, which opens the door to animations, games, and more.
Canvas in Action: Graphing Calculator

Canvas in Action II: Finger Painting

The W3C Geolocation API (http://dev.w3.org/geo/api/spec-source.html) provides a simple way of getting a user's latitude/longitude coordinates:

`navigator.geolocation.getCurrentPosition(callback_function)`

Where `callback_function` is a function you define to receive and process the latitude/longitude data.
Geolocation’s value in ebooks

- Interactive Atlas, Road Maps
- Travel/Restaurant guides customized for user’s location
- Geolocated fiction
- Geolocation-based games (geocaching, scavenger hunt)
Geolocation in Action: A Geolocated Tale


Before...

A Geolocated Tale

It was your typical \textsc{LOADING TEMPERATURE}°F day in \textsc{LOADING CITY NAME} when Muffin Bukowski was roused from decadent slumber by the ear-throttling shriek of an unidentified avian trespassing on the grounds of her otherwise-serene home, clearly violating Section 1, Article 246 of her condo documents.

Groggily stumbling to her bedroom window, Muffin peered through the pristine glass out at \textsc{LOADING STREET NAME}.

“Are my eyes deceiving me?” Muffin muttered as she lightly rapped her knuckles against her forehead, unable to process the miraculous scene unfolding before her...
Geolocation in Action: A Geolocated Tale


After...

---

A Geolocated Tale

It was your typical 82.94°F day in Cambridge when Muffin Bukowski was roused from decadent slumber by the ear-throttling shriek of an unidentified avian trespassing on the grounds of her otherwise-serene home, clearly violating Section 1, Article 246 of her condo documents. Groggily stumbling to her bedroom window, Muffin peered through the pristine glass out at 2 Fawcett St. “Are my eyes deceiving me?” Muffin muttered as she lightly rapped her knuckles against her forehead, unable to process the miraculous scene unfolding before her...
Audio/Video for Publishers

HTML5 lets you embed audio/video directly in your content without any plugins needed:

```html
<audio id="new_slang">
  <source src="new_slang.wav" type="audio/wav"/>
  <source src="new_slang.mp3" type="audio/mp3"/>
  <source src="new_slang.ogg" type="audio/ogg"/>
  <em>(Sorry, &lt;audio&gt; element not supported in your browser/ereader, so you will not be able to listen to this song.)</em>
</audio>

<video id="dancing_pony" width="300" height="300">
  <source src="dancing_pony.mp4" type="video/mp4"/>
  <source src="dancing_pony.ogv" type="video/ogv"/>
  <em>(Sorry, &lt;video&gt; element not supported in your browser/ereader, so you will not be able to watch this video.)</em>
</video>
```
Audio/Video Compatibility Woes
(via Wikipedia)

<audio> support in Browsers
(http://en.wikipedia.org/wiki/Html5_audio#Audio_format_support)

<table>
<thead>
<tr>
<th>Format</th>
<th>Trident</th>
<th>Gecko</th>
<th>WebKit</th>
<th>Presto</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ogg Vorbis</td>
<td>No</td>
<td>1.0, 1.1 [12]</td>
<td>Depends [note 4]</td>
<td>2.5</td>
</tr>
<tr>
<td>WAV PCM</td>
<td></td>
<td>5.0 [15]</td>
<td>52 [note 4]</td>
<td>2.0</td>
</tr>
<tr>
<td>MP3</td>
<td>N/A</td>
<td>No</td>
<td>Depends [note 4]</td>
<td>No</td>
</tr>
<tr>
<td>AAC</td>
<td>No</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speex</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<video> support in Browsers
(http://en.wikipedia.org/wiki/HTML5_video#Table)

<table>
<thead>
<tr>
<th>Browser</th>
<th>Latest stable release version date</th>
<th>Ogg Theora</th>
<th>Formats supported by different web browsers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Google Chrome</td>
<td>14.0.935.202 (October 4, 2011; 2 days ago)</td>
<td>3.0 [30][31] No [note 4]</td>
<td>6.0 [34][35] No</td>
</tr>
<tr>
<td>Opera</td>
<td>11.51 (Build 1067) (August 30, 2011; 37 days ago)</td>
<td>10.50 [44]</td>
<td>No</td>
</tr>
</tbody>
</table>
Ereader Audio/Video Compatibility Redux

For audio, use **MP3**. It works on:

- iBooks
- NOOK Color/Tablet
- Kindle software readers (iPad/iPhone/Android/etc.)

For video, use **H.264/MP4**. It works on:

- iBooks
- NOOK Color/Tablet
- Kindle software readers (iPad/iPhone/Android/etc.)
Audio in Action: Audio-Enabled Glossary

Video in Action: A Clip About `<canvas>`

HTML5 Video Illustrating HTML5 Canvas

Check out this excerpt from *Client-side Graphics with HTML5 Canvases* showing the retro arcade game Asteroids implemented using HTML5 Canvas.
MathML for Publishers

• MathML is an XML vocabulary for representing mathematical expressions.

• MathML provides both Presentation and Content Markup models.

• Presentation markup tags math expressions based on how they should be displayed (e.g., “superscripted 2”).

• Content markup tags expressions based on the mathematical operations performed (e.g., “taken to the 2\textsuperscript{nd} power”)

• The HTML5 specification provides native support for MathML in HTML documents
MathML Presentation Markup Glossary (abridged edition)

- `<math>` -- Root element for a mathematical expression
- `<mrow>` -- Element for grouping subexpressions
- `<mo>` -- Math operator (e.g., +, -)
- `<mi>` -- Math identifier (e.g., variable or constant)
- `<mn>` -- Number
- `<mfrac>` -- Fraction
- `<msqrt>` -- Square root
- `<msup>` -- Superscript
- `<msub>` -- Subscript
- `<mfenced>` -- Parentheses or braces
Convert a Famous Equation to MathML!


\[ E = mc^2 \]
But why write all this markup:

```
<math xmlns="http://www.w3.org/1998/Math/MathML">
  <mstyle displaystyle="true">
    <mi> E </mi>
    <mo> = </mo>
    <mi> m </mi>
    <msup>
      <mrow>
        <mi> c </mi>
      </mrow>
      <mrow>
        <mn> 2 </mn>
      </mrow>
    </msup>
  </mstyle>
</math>
```

When you can just embed the equation as an image?
Advantages of Using MathML Instead of Images:

• Equations are resizing, like text
• Equations can be styled with CSS
• Equations can be interacted with using JavaScript
MathML in Action:
Quadratic Equation Solver

## HTML5 support in today’s ereaders

<table>
<thead>
<tr>
<th></th>
<th>&lt;canvas&gt;</th>
<th>Geolocation</th>
<th>&lt;audio&gt;</th>
<th>&lt;video&gt;</th>
<th>MathML</th>
</tr>
</thead>
<tbody>
<tr>
<td>iBooks 1.x</td>
<td>YES</td>
<td>Sort of*</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>NOOK Color/Tablet</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Safari Books Online</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Kindle Apps</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Kindle Fire</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

* iBooks 1.x supports Geolocation API, but does not support calls to related APIs (Google Maps, GeoNames, etc.)
Download HTML5 for Publishers:
Contact Me!
Email: sanders@oreilly.com
Twitter: @sandersk

Sanders Kleinfeld
sanders@oreilly.com
http://twitter.com/sandersk
Cambridge, Massachusetts
Ebook Alchemist
Areas of Expertise:
- DocBook XML
- XSLT
- XPath
- XQuery
- RDF
- SPARQL
- EPUB
- Mobi
- HTML5
- speaking
- writing

Sanders Kleinfeld has been employed at O'Reilly Media since 2004 and has held a variety of positions, including roles on O'Reilly's Production, Editorial, and Tools teams. Currently, he works as a Publishing Technologies Specialist, maintaining O'Reilly's XML-based toolchain for generating EPUB and Mobi formats of both frontlist and backlist titles. He also helps coordinate O'Reilly's digital distribution efforts to electronic sales channels, and is currently assisting in R&D efforts surrounding HTML5 and EPUB 3, helping to develop next-generation ebook content for O'Reilly and its publishing partners. In his spare time, Sanders loves to read, but primarily print.