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April 2012 Addendum: Alternatives, Content Model, New Tools, Dependencies and Updates

Alternatives

The tools described in the main document embed metadata as part of the image so that, in theory, the metadata will always travel with the image no matter how the image is processed. However, the typical publication workflow utilizes many different tools, and it is not always possible to maintain embedded metadata all the way through the production chain. Other options that warrant exploration include storing image descriptions within the book itself, as has been done up to now, and storing image descriptions externally. This would allow, for example, associating an image description with its image via a URL, or linking an image to a description that is stored locally in a separate directory as part of a larger, downloadable book package.

There are many ways to create alternatives for images that are used in a digital book. They can be described directly within the text of a book, or they can be coded in a manner that allows them to be voiced by reading devices or software. The image can be separately produced as a tactile graphic using a variety of techniques which place a raised image on paper or a tactile display. Three-dimensional models can be made for the student to touch. These and other approaches require significant effort and time to produce. If a standard method existed for incorporating accessible alternatives into digital materials, authoring and reading tools could create and interpret these alternatives in a more efficient manner. A book could, therefore, include not only the text, but various accessible alternatives (e.g., a summary, a long description or a simplified-language description) for each image. Any or all alternatives could be selected by the user based on his or her needs. While the capability to deliver these alternatives to users is vital, the ability in turn for users to easily discover and operate the alternatives is equally important: if the user cannot, for example, find and trigger the long image description, then the author's work to describe the image is of no use. See the section about the DIAGRAM Content Model, below, for further discussion.

Dependencies

Before proceeding further, it should be noted that the successful implementation and proliferation of any of the metadata solutions described in this paper depend in large part on the outcome of a number of ongoing standards and best-practices discussions. The World Wide Web Consortium-- through its HTML5 Working Group and Accessible Infographics Community Group as well as the Web Accessibility Initiative's Accessibility Task Force and Protocols and Formats Working Group-- the EPUB Working Group and other standards bodies are all in the midst of deciding how and when future digital-media architectures and formats will provide

enhancements like image descriptions and other supports for people with disabilities. A major point of contention is that the `longdesc` attribute has been removed from the current draft of the HTML5 recommendation, placing a long-standing method for providing long image descriptions in jeopardy. Authors may still take advantage of `longdesc` as long as reading systems and assistive technologies offer support for it, but it is unclear how long this support will continue if `longdesc` is not included in HTML5.

The lack of a formal, standards-body-approved mechanism to deliver long descriptions is being addressed by the W3C, but for the immediate future the state of image-description delivery should be considered somewhat flexible. Work is now progressing on a replacement for, or enhancements to, the `longdesc` attribute. For example, the Protocols and Formats Working Group-- the committee responsible for the ARIA recommendation-- and the HTML5 Accessibility Task Force are beginning to debate the features and merits of a new attribute, `aria-describedat`, which will provide capabilities for descriptions provided via external references (i.e., URLs) and which can be applied to any element, not just images (a current limitation of `longdesc`). An initial release of this attribute in an update of the ARIA recommendation is tentatively planned for mid-2012, followed by a number of months during which it will be revised and stabilized before being made available in its final state. It is unclear at this time what reading systems will support the new attribute.

It must also be noted that the lack of a long-description mechanism in HTML5 has an impact on other standards and recommendations. EPUB 3, for example, is based on HTML5; as such, as long as HTML5 lacks an image-description mechanism, so does EPUB 3. The DIAGRAM Center Image Description Working Group has taken a short-term step toward addressing this problem by introducing its own image-description attribute into EPUB 3. This new attribute, `epub:describedAt`, is not intended to subvert the work currently underway at the W3C to create `aria-describedat`; rather, it is intended to fill the gap while the Protocols and Formats Working Group completes its work and eventually releases the new attribute. More information can be found at the DIAGRAM Center's proposal for `epub:describedAt`.

The DIAGRAM team continues to develop its information and research agenda based on the widest possible range of outcomes of these standards discussions. Staff will continue to participate in all of these organizational debates, preparing for any and all eventual consensus decisions and planning for the need to transform description metadata from one format to another in order to support publishing practices that emerge and become widely accepted.

Content Model

The DIAGRAM Content Model defines a method to present alternatives to the images found in electronic publications. The content model should not be considered a replacement for `aria-describedat` or, for that matter, the stop-gap `epub:describedAt`. These two attributes will, as described earlier, point to static yet rich descriptions contained outside of the original document. The Content Model will also point to externally stored descriptions, but it also provides a way to deliver multiple alternatives that suit the needs of various readers. HTML and EPUB documents, for example, could use the content model to link images directly to descriptions in multiple formats. A sample content model XML document is available on the

DIAGRAM site. In the sample, note that several alternatives are specified. They are listed and explained below. (See the content model schema for a full list of alternative formats.)

- **`longdesc`**
  A full, detailed description of the image, which can be as long or short as needed.

- **`summary`**
  A brief description, not as detailed as `longdesc` but one that offers more information than simple `alt` text. A user might listen to a `summary` first, and then decide if further exploration of other available alternatives is warranted.

- **`simplifiedLanguageDescription`**
  A detailed description, similar to and based upon `longdesc`, but using a simpler vocabulary than the primary long description.

- **`tactile`**
  A pointer to a tactile representation of the image being described. Because there are several formats used to produce tactile images, authors can specify more than one `tactile` source.

- **`simplifiedImage`**
  A pointer to less-complex representation of the source image. Note that both `simplifiedImage` and `tactile` also contain the **`tour`** element (`tour` may only be associated with these two parent elements). `tour` is a piece of text that can be used to orient the user to the image alternative, to explain how to explore the tactile graphic or simplified image.

New Tools

The following two tools are available which allow authors to write descriptions and provide them within the book text or as external data files:

1. Tobi
   Tobi is a free, open-source multimedia-production application (Windows only) from the DAISY Consortium that creates DAISY-formatted digital talking books (DTBs). It allows authors to synchronize text with human narration as well as text-to-speech (TTS) narration. Authors have the option of using Tobi to record narration, and audio files can be edited as necessary from within the application using a waveform editor. The book text itself can be imported from existing DTBook XML documents (meaning existing DTBs can be edited or corrected after they have been published), or from Microsoft Word or OpenOffice files that have been saved using the Save As Daisy add-ons. In addition, Tobi can be used to add long descriptions to images within the book.

   Authors can add image descriptions by selecting an image and simply typing a description of any length into a text field. That text can be notated as a long description, or it can be notated to be tagged in the export as a simplified description, a summary, a tactile image,

a simplified image or an annotation-- in other words, as description elements defined in the DIAGRAM content model format. Upon export, Tobi will create a new directory where these descriptions are stored as XML documents, a sample of which is shown below.

```
<d:body xmlns:its="http://www.w3.org/2005/11/its"
xmlns:m="http://www.w3.org/1998/Math/MathML"
xmlns:ssml="http://www.w3.org/2001/10/synthesis"
xmlns:xforms="http://www.w3.org/2002/xforms/"
xmlns:rend="http://www.daisy.org/ns/z3998/authoring/features/re
nd/"
xmlns:select="http://www.daisy.org/ns/z3998/authoring/features/
select/" xmlns:tobi="http://www.daisy.org/tobi">
          <d:longdesc xml:id="d_longdesc_0">
               <p>The diagram is titled "Carbon Cycle."
Colorful pictures depict farms, forests, rivers, oceans and
industry. Four arrows encircle the diagram, representing the
cycling of carbon. Smaller arrows illustrate Storage of Carbon
and Fluxes in Carbon through Earth's atmosphere, oceans and
land.</p>
          </d:longdesc>
     </d:body>
```

See the Tobi user guide for more information about adding image descriptions. Note that Tobi continues to undergo development and enhancement, and will support the DIAGRAM content model in a future release.

2. Poet

The Poet image-description tool was developed by the DIAGRAM Center as an open-source resource to make it easier to create image descriptions for DAISY books, and to allow crowd sourcing of image descriptions to reduce cost. The tool is used to add image descriptions to existing books and may be accessed for free from Benetech. Alternatively, the code may be downloaded, installed and managed by the user.

In order to describe images, the user must upload a DAISY book to an instance of Poet, available through a standard Web browser. Poet offers a simple graphical user interface for users to browse the book's images, and provide text descriptions for each one. Once submitted, the descriptions are stored within Poet's online database and can be inserted back into a DAISY book for export. The descriptions are inserted into the book's XML file using the `prodnote` element, and the description text can be read aloud by DTB readers that can recognize and interpret this element (such as gh's ReadHear or the AnyDaisy Firefox extension). APIs are also available for production systems need to access the descriptions directly. (Benetech's Bookshare program is currently using Poet to add image descriptions for books in that collection.)

Here is a code snippet showing what a Poet-produced image description looks like:

```
<prodnote render="optional" imgref="Picture_6"
id="pnid_Picture_6" showin="blp">The diagram is titled "Carbon
```

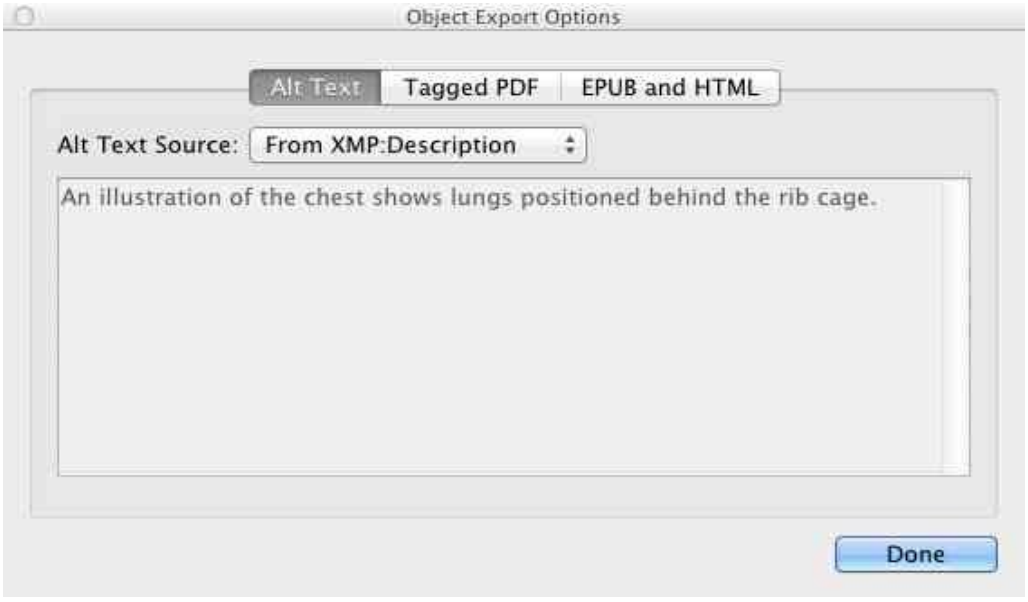
```
Cycle." Colorful pictures depict farms, forests, rivers, oceans
and industry. Four arrows encircle the diagram, representing
the cycling of carbon. Smaller arrows illustrate Storage of
Carbon and Fluxes in Carbon through Earth's atmosphere, oceans
and land.</prodnote>
```

Descriptions supplied in the `prodnote` element can contain block-level markup, such as paragraphs, tables and lists, all of which are useful when describing complex images. Read the Poet user manual for more information about using this tool for writing image descriptions. It is important to note that because Poet is an open-source application, it can be integrated into other authoring tools or workflows, providing authors with image-description capabilities where it was previously lacking.

Updates to Adobe's Creative Suite applications

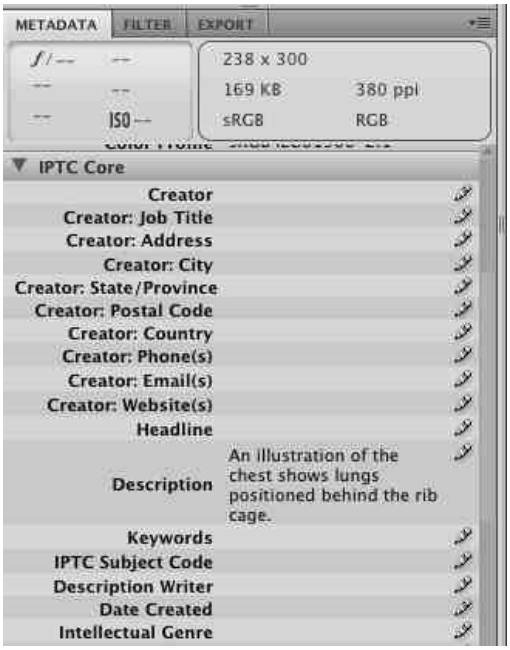
The original paper was based in large part on the use of tools found in Adobe's Creative Suite 5 (CS5). After the paper was published Adobe released CS5.5. New tests of the CS5.5 versions of Photoshop, Illustrator, Bridge and InDesign reveal somewhat improved handling of image metadata. We include a short discussion of the new features in this section.

If description metadata is added to a JPG file (perhaps using Photoshop), that metadata is now available to, and is visible in, Bridge and Illustrator. Furthermore, when the image is imported into InDesign, the description can be revealed in the XMP:Description field of the Object Export Options dialog, as shown in the following image:



On the other hand, description metadata which is added to PNG files using Photoshop cannot be seen by authors when the image is opened in Bridge or Illustrator, nor is it visible when the image is imported into InDesign. However, if the PNG image description is authored using

Bridge, that description metadata will be available and visible to authors when the image is imported into InDesign, and can be seen in the XMP:Description field of the Object Export Options dialog. Below is an image showing where descriptions can be added in Bridge in the IPTC Core tab of the metadata panel:



While improvements have been made in this area, there are inconsistencies in the manner in which embedded image descriptions are supported in CS5.5. Metadata can be successfully passed through various applications in the suite, but the data are handled differently depending on the image format, which could make authoring large projects which consist of a large variety of image formats somewhat confusing. Adobe is aware of this problem and has indicated that it will be addressed in future releases of the software.

Summary

This analysis identifies current opportunities and challenges in development of solutions that both allow original authors to create descriptions that can survive the publishing workflow and allow subject matter experts or others to modify or add contextually appropriate descriptions at different points along the production and distribution chain. Both of these capabilities are essential to the creation of high-quality accessible digital books.

As outlined in this paper, there are several metadata standards in wide use today for embedding information into digital images. Each of the identified metadata specifications contains one or more fields that could be used to carry image description embedded directly in the image file. The definitions of these fields in their respective specifications indicate they should be used for descriptive information about the image. While those standards were and are continuing to develop independently, there are efforts to create a rational framework for integration of metadata stored in those disparate formats.

Although it is not currently possible to maintain embedded metadata all the way through the chain, there is enough of a germ of metadata handling in several of the existing tools that there are good opportunities for discussions with the tool developers to extend the capabilities across a wider section of their product lines. There are discussions currently underway with some of those developers to explore these opportunities.

Useful References

http://exif.org/specifications.html
http://exif.org/Exif2-1.PDF
http://exif.org/dcf.PDF
http://www.jeita.or.jp/english/
http://www.iptc.org/site/Home/
http://www.iptc.org/std/photometadata/specification/IPTC-PhotoMetadata-201007_1.pdf
http://dublincore.org/documents/dces/
http://www.metadataworkinggroup.org/specs/
http://www.metadataworkinggroup.org/pdf/mwg_guidance.pdf
http://www.adobe.com/devnet/xmp.html
http://www.w3.org/TR/SVG-access/
http://www.w3.org/TR/SVG/struct.html - DescriptionAndTitleElements
http://www.w3schools.com/svg/svg_rect.asp
http://www.daisy.org/z3986/2005/Z3986-2005.html#PubMed
http://manuals.viewplus.com/en/view/7/55/
http://www.w3.org/community/infographics/