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ACCESSIBLE E-BOOKS FOR DISABLED PEOPLE

STRUCTURED DESIGN OF ONLINE BOOKS ASSURING ACCESS TO E-LEARNING

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ABSTRACT

The aim of this paper is to illustrate Structured Design of Documents (SDD) with special focus on print disabled readers in terms of defining an applicable meta-data formatting specification for publishing companies ensuring accessible e-books meeting the needs of print disabled readers. **Print disabilities** are impairments that prevent people from holding printed materials or from reading independently for themselves standard print due to a visual, perceptual or physical disability. SDD can also be regarded as the prerequisite for E-Learning whose foundations are electronic documents.

This means that **Advanced Learning Technologies** in the context of accessibility are adaptive to the disabilities and individual preferences of learners who need to access their learning resources in their preferred medium.

The ultimate benefit of SDD lies in the fact that an accessible rendition of the document for print disabled persons is being produced. Addressing SDD in turn gives rise to Multi Channel Publishing (MCP) which means, publications are chosen out of a

content pool for a specific target audience, the appropriate content objects are assembled and a rendition is produced and published via multiple channels - like paper, web site, portal, e-Book, CD/DVD, PDA, wireless - to reach the target audience.

1. INTRODUCTION

Gutenberg's invention of the movable type entailed pervasive changes as this principle made it possible to widely distribute information fast and to many people simultaneously for the first time. Furthermore the copying of texts was facilitated and also the costs involved were reduced.

However some parts of the population thirsty for knowledge were excluded: Denials on the community of the blind were inherently imposed but this changed with the aid of embossed letters for tactile printing. From now on blind people were enabled to gather access to information requested.

As the information technology era is heralded computers, electronic communication and the Internet become predominant in our daily life giving rise to plenty of problems. Many people with disabilities stand to be victims of the Digital Divide. Therefore "Access" issues need to be taken into account as new technologies are developed and particularly with regard to electronic books new requirements are to be met ensuring **accessibility**.

The way information is retrieved by blind persons changed dramatically due to the advent of digital representation of information - the Braille display generally counteracts that burden. Nevertheless some other parts of disabled people were still segregated; such as visually impaired persons: Print disabilities are impairments that prevent people from holding printed materials or from reading independently for themselves standard print due to a visual, perceptual or physical disability. These disabilities include blindness, visual impairment, but also dyslexia, severe arthritis and other types of learning disabilities or reading difficulties.

2. DISABLED PEOPLE SHOULD HAVE ACCESS TO THE PRINTED WORD

It is often regarded as one of the strengths of the Internet that it opens up channels of communication and provision of access to information for people who have previously been excluded from full participation in the economic and social life of the country. Demand for access to the Internet and consequently access to information by people with disabilities is steadily increasing and now seen as a human rights issue. While physical disabilities inhibit keyboard use, visual impairment inhibits screen use and learning disabilities prevent large numbers of users from participating in the benefits of the Internet and its rich resources.

Internet accessibility is important to allow all people in the community full participation in communications systems, education, employment and other economic opportunities regardless of their physical capacity (Maharey and Swain 2001).

3. STRUCTURED DESIGN OF E-BOOKS AND MULTI CHANNEL PUBLISHING

As E-Books saw the light of day new obstacles were imposed on disabled people. Therefore new requirements need to be taken into account with regard to electronic books ensuring an accessible rendition of the document. Certain guidelines have to be adhered to in order to **retain the structural design** of the original layout and to assure an accessible output version of the document. This means that the textual elements a book comprises (figures, tables, lists, index entries, headings, links, stanzas, etc.) are to be indicated as such already during the layout process. Otherwise non-accessible plain text outputs would be generated.

Thus the subject of this paper deals with Structured Design of Documents (SDD) with special focus on visually impaired readers paving the way for Multi Channel Publishing (MCP) in terms of defining an applicable metadata formatting specification for publishing companies wishing to distribute their books via electronic media.

Meta-data is information that describes or classifies other information. It is also described as structured, descriptive information. Metadata elements are the individual parts of a metadata schema, used to describe individual characteristics of a resource and to give the description its structure.

MCP means, publications are chosen out of a content pool for a specific target audience, the appropriate content objects are assembled and a human-readable rendition is produced which is published via multiple channels - like paper, web site, portal, e-Book, CD/DVD, PDA, wireless - to reach the target audience.

Additionally the author's specification gives rise to process automation within the publishing companies which lies in the fact that the layout of the book has to be designed just for one time and may be exported to any format supported by the DTP tools (e.g. PDF, LaTeX, XML, HTML), retaining the structural design of the original layout; e.g. captions have to be at the same position both in the printed and in the HTML version. It is not acceptable to author separate documents for print and online delivery. Both instances must be derived from a single structured document, XML facilitates this process.

4. DEVELOPING STRUCTURE DEFINITIONS FOR CONTENT OBJECTS

Instead of creating formatting tags based on a document’s appearance, content objects must be identified. As formatting is often a visual indicator of structure (headings are usually larger than surrounding text), but structure elements are relevant when formatting does not provide a cue.

All these elements of a given document type have to be arranged according to a hierarchical tree structure. For example we could represent a book containing a front and body part. The first of which contains a table of contents and the second chapter 1. Chapter 1 in turn contains Chapter 1.1 and a heading. Both instances can be derived from their ancestors (Contents and Chapter 1). Clearly, there are many such trees that might be drawn to describe document structure.

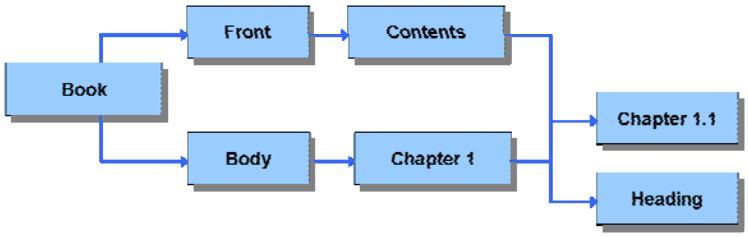


Figure 1: Document Tree - Inserting Structure Element Nodes into the XML-Tree

5. XML, DTD AND EXTENSIBLE STYLE LANGUAGE TRANSFORMATION

XML represents a consistent approach to identifying the document's components and how they relate to each other. The process permits explicit tagging to identify the components. Document structures can be defined depending on the specific requirements. XML also includes a DTD: Document Type Definition which defines the "allowed" elements and specifies the order in which the elements may or may not appear. The authoring process must produce documents that conform to the specifications of the DTD. Any document that is "valid" according to a specified DTD can be processed for the desired output and validated against the DTD by an XML parser - a check relating to the compliance with the DTD.

XML is a descriptive markup language rather than a procedural markup language. A descriptive markup language uses codes, called elements, to name and categorize parts of a document. It is designed to create documents where the computer processing the document can understand what the parts of the document are and assemble it appropriately. Procedural markup language, like that of HTML, is often used to represent text in a certain style like bold. <bold>This text is bold.</bold> allows a Web browser to represent the text as: **This text is bold.** XML-based documents may be transformed for Web, Braille, speech output, etc.

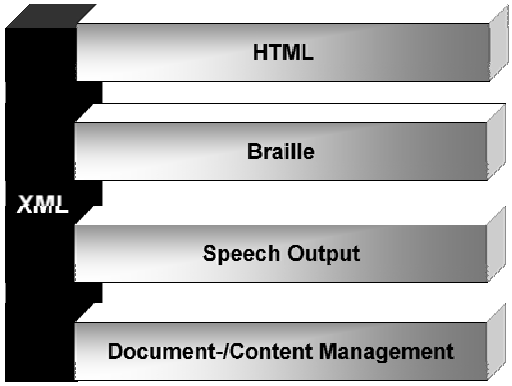


Figure 2: Transformation of XML-based Documents

The Extensible Stylesheet Language (XSL) describes how the XML document should be displayed. XSL-Transformation is used to transform an XML document into another type of document that is recognized by a browser, like HTML. Decisions about the handling and representation of each structure element into HTML can be taken, according to the needs of print disabled readers while elements and attributes can be added, removed, rearranged or hidden.

Figure 3: Process of Conversion

6. THE FIELD OF APPLICATION

With regard to selecting the relevant structure elements recognized as being of crucial importance for the accessible layout of books one established standard called "*Text Encoding Initiative*" has been referred to - "relevant" to the needs of print disabled readers. Building up on the TEI schema the accessible meta-data tagging specification is applied in the context of the authoring tool Adobe ® InDesign® CS. It supports the

utilization of Document Type Definitions and therefore integrates XML files into its visually oriented publishing workflow consisting of the document's mark-up and the content. When applying the specification ensuring accessible documents, information providers were instructed to use the tools they have at hand.

The following examples show the relevance to accessibility:

Example 1

A text or other nonvisual description of a graphical element is intended to be an alternative to the graphical presentation:

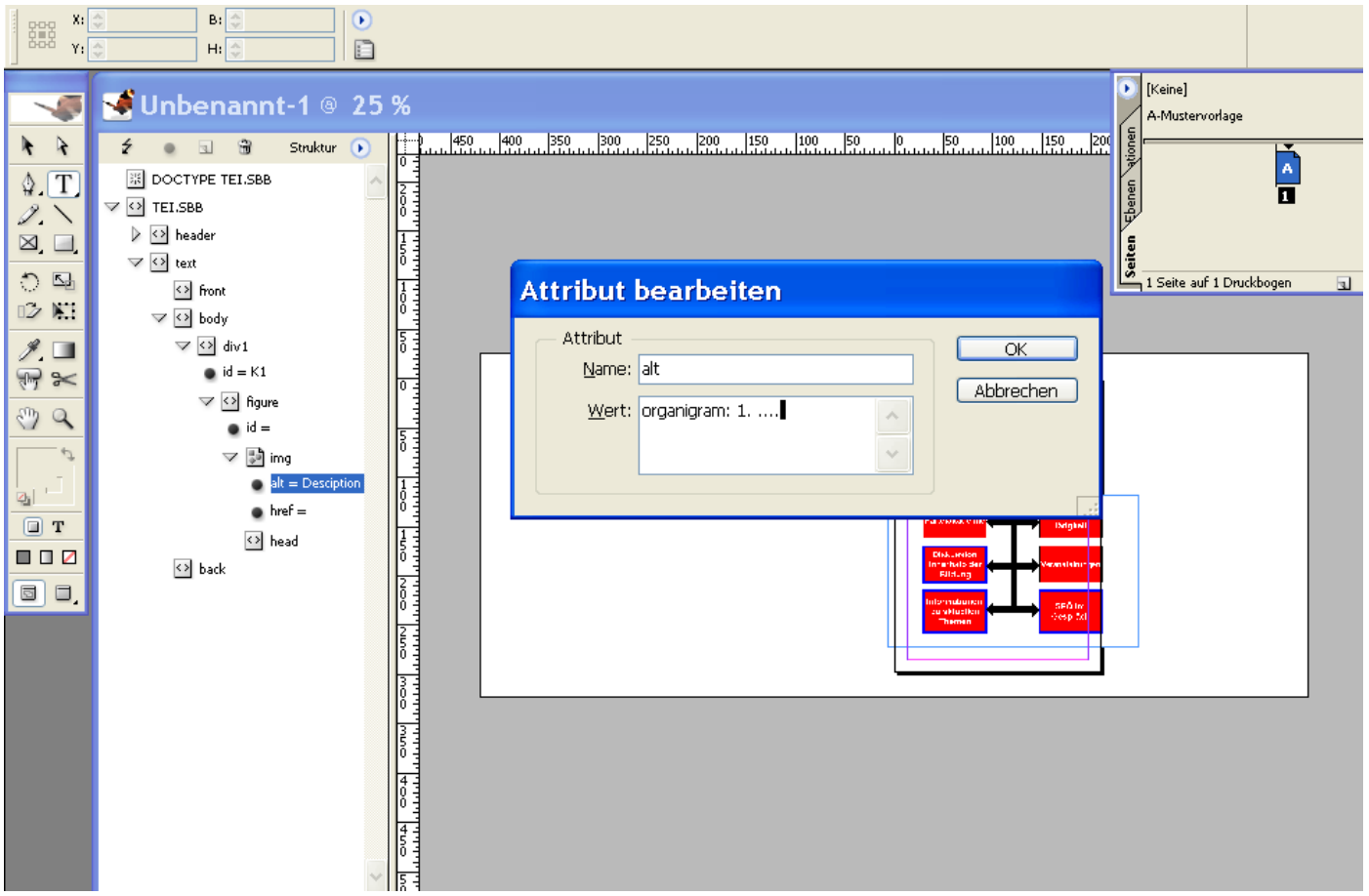


Figure 4: Applying an Alternative Description to a Figure with Adobe Indesign CS ®

Example 2 is an illustration of the necessity of structure for navigational purposes:

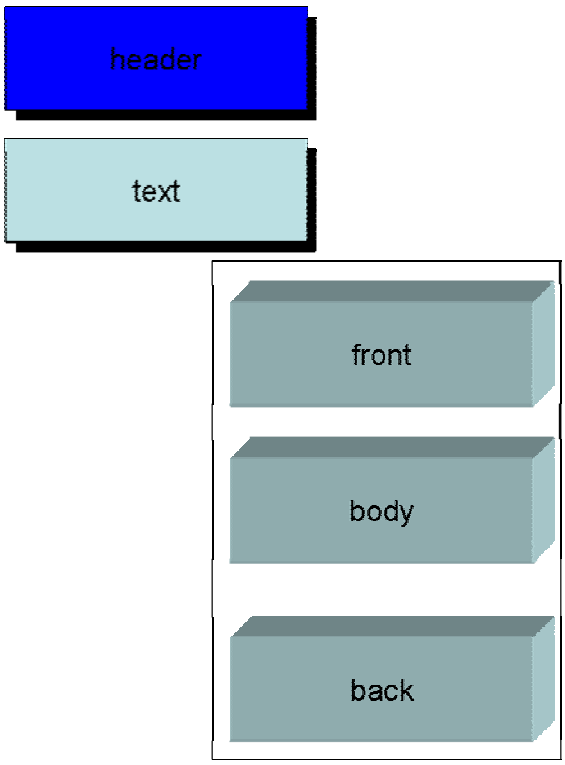
ACCESSIBILITY OF TABLES

W3C Techniques for Web Content Accessibility

summary information and identifying row and column information **row and column headers**

InDesign tables must conform to a specific structure and are rendered according to the CALS table model that refers to OASIS.

7. ARCHITECTURE OF THE DTD



The text body contains seven levels of hierarchy, representing the chapter structure. Within each level the following elements may be used as often as needed: Paragraph, Figure, Heading, List, Notes, References, Pagebreak, Linebreak, Pointer, Link, Style and Table.

Continuous text should be embedded in a paragraph whereas line breaks within a paragraph can be compelled by the use of an empty "lb" element. The page break as well is indicated by using the empty "pb" element and the page number of the next page is to be assigned as an attribute.

Individual table elements are tagged automatically by Adobe InDesign. The table-tag in the tag-set just acts as a container for the divers elements (e.g. <tr>...</tr>, <th>...</th>, <td>...</td> , <thead>...</thead>, <tbody>...</tbody>, <tfoot>...</tfoot>, ...).

Emph-tags create style elements by assigning of the following attributes: italic, bold, underline, overline or stroke.

The front is composed of the elements titlePage, contents, foreword, dedication, abstract, ack, docAuthor, docDate , docEdition, docImprint, docTitle and the back contains appendix, glossary, notes, bibliography, index and colophon.

8. CONCLUSIONS

Structured authoring offers the prospect of full access to learning materials for print disabled people who formerly were inhibited of being well educated. In a society where equitable access is being exercised the terms for normality and abnormality lose their meaning as characteristics of individuals!

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