ADAPTING DIAGRAMS FOR DAISY BOOKS

Lilian Genaro Motti[1,3], Dominique Burger[2,3]

1 / Association BrailleNet
quai St Bernard
75005 Paris
FRANCE

2 / INSERM, UMR_S968
Institut de la Vision
F-75012 Paris
FRANCE

3 / UPMC Univ Paris 06
UMR_S968
Institut de la Vision
75012 Paris
FRANCE

ABSTRACT

Looking for the best way to publish accessible graphics, this presentation gives some information about how to deal with non-textual contents when adapting documents for DAISY books. It is based on a study conducted by Braillenet for enriching the Helene's digital library with technical contents. By analysing publishing guidelines, transcribers' work in specialized centres and main relief printing formats, this work presents thoughts on how to analyse a graphical content, how to produce vectorial images, the main steps for preparing digital image files that could be downloaded and printed, how to index these files into the DAISY book, and finally make them accessible.

1 Introduction

This paper presents a case study investigating the techniques available to render non-textual contents for people with visual disabilities. This study was conducted in the context of the Helene project of BrailleNet at the request of an ICT company interested in preparing accessible books for telecommunication technicians and engineers (BrailleNet 2009).

When books are made of textual contents, there are simple tools for structuring them and exporting them in XML DAISY formats suitable for further transformations. One can mention the Save-as-DAISY function in MSWord and the ODT2DAISY in Open Office (Duchateau / Beraud 2008). In some cases graphical information is marginal in the book or even redundant, and thus can be ignored in the adaptation process.

In many areas of knowledge, however, graphical information is necessary for presenting, understanding and exchanging data and concepts. Technical documents about computing, telecommunications, mathematics, physics and others areas present some diagrams to which access is essential for equality in education and inclusion at work. Unfortunately, guidelines for adapting images, beside alternative texts, are rare and not very specific.

This research paper examines whether a methodology is possible for adapting diagrams, so they could be indexed, downloaded, displayed or printed. The second section relates the case study we carried out. It

draws some conclusions on how to analyse a graphical content, the main steps for preparing digital image files that could be downloaded and printed, how to index these files into the DAISY book and finally make them accessible. Then the third section provides some figures in terms of workload and expenses. The fourth and last section presents final remarks and proposals for future developments.

2 The Case study

For this study we chose to concentrate on one significant case provided by a book about networks and telecommunications (Servin 2006): This book presents many diagrams and a complex structure with mathematical formulas, several levels of headings and footnotes. It is one of the main the reference books in French on the subject.

First, we report some remarks about the main kind of diagrams and how they are observed in technical books. Then, we looked for the user's needs and most used displaying and printing devices in France. After this, we report some transcribers' advice for adapting diagrams. We also investigated the kinds of accessible image formats that we would be able to provide. Finally, we present our proposal for practical application: text converting, selecting diagrams, re-drawing, indexing and publishing.

2.1 Preliminary analysis of non-textual contents

A diagram is a visual synthesis of significant information, consisting of a geometrical representation of qualitative and quantitative data. It can also be called graph or chart. Some examples of common diagrams are maps, technical drawings, sketches, line graphs, bar charts, pie charts, network diagrams, histograms, flow charts, scatter plots, three diagrams and others.

In order to adapt a diagram, the first operation is to analyse it from a semantic point of view as to better understand the information it contains and decide if this information is redundant with the text or not. A simple way to do that is to describe the image as a text. In some cases this description may be sufficient to express fully the meaning of the diagram. Some diagrams are not more than illustrative, or even ornamental. Such diagrams should be mentioned in the text, but not necessarily adapted. If not, this may at least provide a rough indication of what the diagram is intended to do in terms of communication. This is also a step of the analytical work towards a more precise identification of the key elements in the diagram and what elements or details can be simplified or removed. Then the diagram can be redesigned for alternative supports, like enlarged images or raised line ones. Often, simplified diagrams have to be completed with textual explanations. In some cases, it is necessary to break down a single initial diagram into multiple ones. Indeed, a series of simplified drawings commented on by a short text may guarantee a better understanding than a synthetic complex image. It should be stressed here that preliminary analysis requires both an understanding of the subject of the document and some experience about how to work with impaired vision.

2.2 Digital image files

Since adapted diagrams are intended to be incorporated in digital versions of books, like the DAISY Dtbook for instance, they have to be available in digital files that can be linked to the text sections they correspond with. Digital image files are flexible and can provide input for different rendering devices. Moreover, digital image files benefit from all digital communication advantages: they can be transferred, downloaded, improved, displayed and printed. Digital images can also be tagged and receive metadata for further retrieval. The textual alternatives for images, as proposed by accessibility guidelines, cannot be disregarded.

A variety of display devices can be used for matching the various needs of the visual impaired people. They range from visual displays to tactile diagrams produced by different techniques like embossing or heating swell-paper print.

2.3 Vectorial images

Vectorial graphics, as opposed to bitmap or raster graphics, are made of geometrical shapes based on mathematical equations and codes. When resized and zoomed these images keep the best quality possible. They are compatible with most displaying devices and printing techniques and they can be easily edited. Thus using formats capable of handling vectorial images seems the best way to proceed.

W3C recommends SVG (Scalable Vector Graphics) as an image format compatible with XML (Extensible Mark-up Language) application for producing Web graphics. Several commercial software applications make that possible. The adapted vectorial diagrams can be archived in a database before being exported in other formats like PDF (Portable Document Format) as a final ready to print format, for instance.

2.4 Tactile diagrams

There are various techniques to create tactile diagrams. We have dismissed some traditional techniques that require manual intervention to focus on techniques involving the production of tactile diagrams from digital files. Four techniques have been considered:

2.4.1 SWELL-PAPER PRINT

This process consists of bringing out in relief all the black parts of a document printed on a special paper and submitted to a heat treatment. This paper contains micro-capsules that have the property of deforming when heated up. The paper passes through an oven at a specific temperature, so the black part receiving more warmth, swells and reveals the drawing in relief.

Embossed diagrams: some printers used to print Braille or embossing allowing different dot sizes and dot spacing can produce lines and textures, thus tactile diagrams.

2.4.2 SILKSCREEN TECHNIQUES

A silk screen is interposed between the ink and the surface. The materials used can be varied and not necessarily flat (paper, cardboard, textiles, metal, glass, wood, etc). It allows a deposit of ink that ensures enduring relief, transparency or intense colour. It is not generally accessible to the individual reader, but may be economically attractive for a small number of copies.

2.4.3 PRESSURE TECHNIQUES (GAUFRAGE)

A matrix is prepared from a digital file, a raised board obtained by pressing or carving, then pressed to the final surface. The resulting relief presents a very good definition of contours, lines and dots, including text in Braille. *Gaufrage* can also be applied to a board that has already been printed in colour and materials of different composition and durability, such as cardboard or PVC. This technique is expensive, but allows a large number of high quality copies.

Relief diagrams shall comply with some recommendation. For instance lines thickness should range from 3 to 6 pt. Simple or double lines make a differentiation possible. Up to 5 different touch sensitive textures can be used, regarding the distribution of their printing areas. Arrows should be open. Braille text should be between 22 and 24 pt. as font size and only the colour black should be employed. It is worth noting here that the main cost comes from the work of analysis and adaptation of images, rather than the expenses for equipment and materials.

2.5 Processing a book sample

We have chosen the first chapter of "Réseaux et télécommunications" as a sample to carry out all the operations required for making it accessible.

• We have scanned them to obtain a digital copy;

• The resulting digital files were converted into text by an OCR (Optical Character Recognition) software[1];

• The figures were isolated in their context and made available in .jpg files;

• The resulting text was exported into Microsoft Word 2007 (as .docx files) and to Open Office 3.1 Swriter (as .doc files);

• Subtitle and an alternative text description have been prepared for all figures;

• The figures were analysed to decide whether a further process adaptation would be necessary;

• These diagrams were re-designed in a vectorial graphical format, then they were exported in PDF which keeps vectorial properties and can be displayed on screen or printed on A4 paper. The adapted diagrams were stored in the server for possible further adaptation, improvement and editing;

• We created hyperlinks for vectorial format and relief printing version (with Braille text) on the subtitles;

• XML DAISY was produced using MS Word Save as DAISY plug-in.

3 Workload and cost

The book "Réseaux et télécommunications" has 960 pages and 1,100 figures. The sample we studied has 36 pages and 41 figures, among which 22 are decorative. Hereafter are the main steps and the approximate time spent on this sample treatment (Table 1):

• contacting publisher, asking for copyright, requesting prospective digital file: 30 min.,

• scanning, converting into text by an OCR software, inserting basic structure: 45 min.,

• structuring complex files in a text software, validating by DAISY translator tools: 45 min.,

• inserting subtitles, providing text of replacement, selecting figures to be adapted and adaptation of 19 figures into vectorial files and relief printing: 15 hours,

• final publishing and control: 15 min.

On the basis of a 36-page sample, the average adaptation cost is more than 7€ per page. Thus the adapting cost for the whole book could exceed 7,000€. The largest share of it, by far, lies in structuring content and adapting images. However, the share of these two operations is variable depending on the contents.

Summary	Time (h)	Costs (15€/h)	Percentage
Publisher	0,50	7,50	3,00
Scanning	0,75	11,25	4,00
Structuring	0,75	11,25	4,00
Diagrams' adaptation	15,00	225,00	87,00
Publishing	0,25	3,75	2,00
TOTAL	17,25	256, 75	100,00

Table 1: time spent for adaptations and estimated costs

---

1   Abbyy Finereader was used.

4 Conclusion

This study has examined the process for adapting contents including technical diagrams. It analysed how XML DAISY books could be produced including the adapted digital image files published on internet servers. It pointed up the need for more specific guidelines for preparing the files in order to produce accessible diagrams. It also provided some indications about the cost of the full process which appears to be very high.

One direction for minimizing these costs is to take into account the accessibility issue earlier in the book authoring and publishing process. For that cooperation with publishing professionals, including companies working on behalf of publishers in the composition of their books could be a very promising track.

As a complement our study suggests that it could be useful to have a more flexible system capable of providing the application and content desired by the users. For this, a cooperative model like Wiki may be appropriate. It would allow experts from diverse backgrounds, including professionals, authors, colleagues or even relatives of those concerned to contribute, providing and editing adapted contents.

5 Acknowledgments

References

BrailleNet (2009). Helene server-Bibliothèque helénè. Retrieved from: http://www.serveur-helene.org

Servin, Claude (2006). Réseaux et telecommunications. Dunod. Paris

Duchateau, Sylvie / Beraud, Philippe (2008): "Créer des documents accessibles avec Microsoft Office Word 2007". Versão 1.1, Microsoft corporation. Retrieved from: http://www.microsoft.com/downloads/details.aspx?FamilyID=CABBA7DA-4E34-4FFC-AC3B-596110CF9BC9&displaylang=fr