

ENHANCING ACCESS TO GRAPHICS

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ABSTRACT

Print impaired people (those who are blind, partially sighted and dyslexic) are at a considerable disadvantage within learning and vocational environments where the role of graphs, charts and visuals are significant. Visual information is the most difficult body of information to relay to print impaired people but for many years there have been initiatives to provide this information in alternative formats. The opportunity now exists to incorporate some of these established technologies with emerging initiatives and standards, to ensure that suitable information is embedded in more mainstream formats to make a larger body of information available to print impaired users. This paper considers some recent initiatives in this area.

1. INTRODUCTION

The potential unleashed by developments in ICT for people with impairments is remarkable, combining as it does the flexibility and power to meet complex needs in complex situations. In many ways this paradigmatic shift can be considered to embody the modern equivalent of common sense. If a suitable level of abstraction is pursued, it can provide archetypes of implemented practical knowledge which can then be accessed by a user and specialised to their personal requirements. If we are fundamentally to examine the different aspects of designing a more inclusive world, we must also consider the education of software designers and innovators to think about an inclusive world. This activity cannot be performed in isolation, as there is a parallel need to educate consumers to make their demands more explicit. We must also provide software designers and innovators with a clear insight of the fundamental impact of the Design For All approach. This can be achieved through educating software designers who in turn will educate consumers. The products from these designers should raise public awareness of Design For All through

demonstrably useful products. These products will have a built-in software interface that enables a dialogue between the developers and consumers and it is this dialogue that forms the basis for favourably influencing public opinion. In this way, the emerging results of this educational process would be a far wider and more 'openfocus' within design processes.

1.1 FNB

FNB is the largest library for the blind in the Netherlands. FNB is one of the leading organisations in implementing digital audio and internet services for general literature, study literature, talking magazines, newspapers and music. FNB serves 26,000 clients for general audio materials, and has 15,000 clients for spoken newspapers and 3,500 clients for study materials. Every year just under 1 million pages are produced in Braille, and some 2.3 million pages are reproduced. The collection of spoken books contains about 67,000 titles, with 3,500 new titles being produced every year. There is a collection of about 4,000 Braille Music scores and 500 Spoken Music scores. Each year just under 10,000 tactile drawings are produced and 50,000 are reproduced. The FNB International Projects Department has been involved in a large number of European Commission funded projects over the last 10 years. These projects have addressed many different aspects relating to design and accessibility of materials and information for the print impaired population throughout Europe.

1.2 TZI

The Image Processing Department at the Technologie-Zentrum Informatik (TZI) is a competitive research and technology transfer unit and has participated during the last years in many European projects and partners both from the industrial and the university research sector. Beside the navigation of autonomous robots using landmark recognition, another priority is the application of multimedia indexing in the assistive sector. In projects like TeDUB and Image and Graphics Reader, images are

interpreted and presented according to the needs of visually impaired persons. The TZI concentrates the resources already available at the Department of Mathematics and Computer Science. It comprises "Centres of Excellence" as well as technology departments which complement each other on the basis of application-oriented research. In this context, the TZI as a service provider of computing technologies is especially interested in cooperation with industrial and commercial partners. Along with practical experience resulting from application projects, extensive computing knowledge and a continuous offer of transfer activities, the TZI provides the basis for successful cooperation projects. The transfer of information technologies is realised by: Analysis, conception and prototype development; scientific consulting; security tests, verification of software ergonomics and training programs.

TZI has taken part in several EC projects: ADViSOR, DataShare, TourServ, VICTORIA, APPLIGRAPH, etc.) as technology provider in the following research areas: Content based analysis and retrieval of images and videos; Development, verification, and test of reliable systems; Certification of user interfaces of software systems; Management of complex information systems; Technologies for the development and distribution of multimedia document databases. TZI is the co-ordinator in the TeDUB ("Technical Drawings Understanding for the Blind") project, aimed at transforming visual information in technical drawings into an understandable form for blind people. TZI will also be the co-ordinating partner in the G2T project ("Graphics to Tactile") which goal is developing a software tool for the transformation of graphical information into tactile diagrams.

2. REVIEW MATERIAL

2.1 Relevant Projects

2.1.1 TeDUB

The TeDUB project has developed a computer-based tool for visually impaired users, which is capable of automatically analyzing, handling and presenting the visual data in technical drawings. The project was co-ordinated by George Ioannidis at TZI and funded under the European Commission IST Vth Framework Programme. The TeDUB system makes this graphical information accessible using semi-automatic and automatic analysis of graphical content and through the import of file formats that contain semantic information. After the analysis, the system presents the information to the blind user through a specialised navigation interface. To avoid recreating complete new software environments for blind users, the system is build in such a way that no specially for this system developed hard- or software is needed. The system can be operated with a standard computer keyboard or with a joystick. The output will be transferred to the user by a (for visually impaired computer users)standard screen reader or Braille bar. The joystick provides the user also with spatial information

about the location of the different object in the diagram. Although it is not necessary for all diagram domains to provide spatial information, it might help the user in understanding the diagram or in the communication with sighted readers of the same diagram. The information in the diagrams is remodeled in such a way that the user can easily navigate though the diagrams. As far as possible the used commands follow the standard windows commands.

2.1.2 G2T

The Graphics to Tactile project (G2T) aimed to provide a semi-automatic image processing tool to enhance and support the creation of tactile graphics. The G2T system makes therefore use of advanced image processing technologies partially to automate the tactile graphic production process. The results of the G2T tool can be used in conjunction with existing drawing tools to fine-tune the drawing. The original drawing has to be available in digital format so it can be imported into the G2T software. After having opened the drawing, relevant parts can be extracted from the drawing by using different operators and settings based on contour and color selection. Filters and operators include a RGB median, a color extraction based on RGB thresholding can be used to pre-process the data to enhance the quality of the extracted parts, or to extract the relevant parts. Depending on the quality and the characteristics of the drawing the G2T tool can save time on the production of tactile drawings.

2.1.3 AccessSVG

The forthcoming AccessSVG project aims to make use of state of the art technologies to provide practical applications and services which are of considerable benefit to both print impaired people and the wider public. By harnessing the power of metadata and semantics, the project aims to provide a framework which can provide enough information within an SVG image to afford the user the choice of representing the information in the manner most suitable to their preferences. These features can be addressed in such a way that the requirements and preferences of both sighted and non-sighted groups are met simultaneously.