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Creating a User-Specific Environment: The Author Implications

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Abstract: Our empirical survey shows that users with visual impairments find the sheer volume of information in typical web pages to be overwhelming and therefore sometimes refrain from using the web. By developing the concept and use of the Essentiality and Proficiency Tool we allow the user to personalise the content they view with the level of essentiality specified by both the author and the user. Hence in this paper we explore one method of rating essentiality and the application of the essentiality levels to web content. The author is given the task of ensuring that the most essential content is relayed to the user given the user's preferences for volume. We present one such example of the author rating the content and the implications. The tool allows the user to personalise content based upon how much information is required or acceptable, by selecting a band of 'essentialities', the user's 'proficiency'. This is then matched with how 'essential' the designer feels are various areas of the content. Together this collaborative importance rating determines the presentation of the content. Hence the importance of this tool lies in the collaboration of the essentiality level set by both the author and the user, resulting in just the right amount of content (determined by the user) conveying just the right amount of detail (determined by the author).

Key words: essentiality, proficiency, personalisation, user-content, user-trails, author mark-up, collaboration.

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1 Introduction

The Web has been found to be not the most accessible of tools due to the lack of awareness of universal design in the development of web pages. Clarkson et al (2003) and Kottapally et al (2003) have found that in the past even where this awareness is present, the result has been the development of many versions of one site, each catering for different viewer needs. Furthermore as stated by Pierrakos et al (2003) there have been many cluttered pages and pages overloaded with information that have led to users with visual impairments refraining from using the pages. The Essentiality and Proficiency Tool enables such users to take full advantage of the Web. It is worthy of note that although modelled upon the visual impairment community we foresee the tool being used a much wider user base. The main objective is to present content in just the right format and a digestible amount for both the user and/or the viewing device.

Research has shown that even though WCAG 1.0 goes a long way to ensure accessibility, the web still presents a usability issue. The findings from the preliminary survey carried out by Dhiensa et al. (2005) have highlighted a three-fold problem of 'information exclusion', the lack of awareness of universal design in the development of the Internet and websites and their inaccessibility still experienced by real users. This is all-the-more unforgivable given that standards have been developed and legislation has come into force. Our solution will be explored in the form of the Essentiality and Proficiency Tool, which incorporates user profiles to increase accessibility and usability of websites. The Essentiality and Proficiency Tool is considered in contrast to other possible solutions. User profiling is briefly discussed as a means of incorporating universal design into increasing accessibility of information from the Internet. This is built on top of the Essentiality and Proficiency work and ensures that the selected content is presented in a user-oriented manner.

The Essentiality and Proficiency prototype, when developed applied user preferences client side but now we are trying to build the system that works server side, this is to ensure cross browser compatibility. The system will take into consideration important factors highlighted by the testing of the prototype. Once the tool has been developed it will again be tested by a range of visually impaired users.

1.1 Current Solutions in the Allied Domains

There have been many attempts to address the issue of making web content more accessible, for example Kottapally et al (2003), AccessIT (2004), Hanson (2004), Lee (2004), UMIST (2004), Brajnik et al (2005), Gupta et al (2005) and Paramanto et al (2005). Hanson's (2004) Web Adaptation Technology is a prime example that offers users with varying disabilities the ability to customise the visual interface to meet their needs. Users are given various options by which they can alter the interface. The contents of the page can be enlarged and the font adjusted, for example, in order to reduce the distractions on the page. The Web Adaptation Technology allows the user to change the visual content 'on the fly'. The key to this technology is that it adapts content returned from HTTP requests and thus the visual adaptation appears exclusively for the user and the page source is left unchanged. Another example is Carreira et al (2004) with their WebClipping2, which incorporates a content-based filtering coupled with a user profile strategy to extract news articles that are of interest to the user in accordance to their profile. Similar technologies are available under the banner of Really Simple Syndication (RSS) to enable web sites to receive and relay up-to-the-minute news in real time. It would certainly be advantageous to monitor the development of this technology in the current context.

2 The Essentiality and Proficiency Tool

As a further solution we present the Essentiality and Proficiency Tool, which addresses the issue of inaccessibility due to the overwhelming amount of information. In any collection of information - for a web page or otherwise, some passages of information are more important than others. By rating the content based upon how essential it is to the process of conveying the meaning of the site, we can develop a method for restricting the volume of content that is fed through and displayed on to a given web page. The author is required to perform this rating, as it is only the author who will know which part of parts of a given page are the most 'essential'. In fact, various passages are rated according to this scheme and so a profile of the whole page is developed.

The Internet is almost entirely a visual experience therefore it is important that visually-impaired users are able to access the same information easily and in the most suitable format for their needs just as it is displayed for all others. The obstacle to easy navigation and usability for the visually-impaired user is the sheer volume of information on the page in front of them. Therefore the key to easier navigation is the ability to control the amount of content provided. The Essentiality and Proficiency Tool offers the user the choice of selecting the level of essentiality of the information required. Clearly the user is in the hands of the author, the latter having rated the content passage by passage. The result of this is that visually-impaired users can limit the textual information or images displayed on the page according to their needs.

The tool then goes further in that it allows the user to apply their own formatting preferences and this is where the user profiles come into play. There are a huge variety of eye conditions varying in severity from cataracts and nystagmus, both of which limit sight although in different ways, to almost complete depletion of sight. Each of these conditions has a different set of presentation requirements when it comes to using the web. A profile can be defined through a collection of parameters such as font size, font colour, background colour and text style. The parameters are chosen to allow the results to be displayed in a form suitable for users across a wide range of conditions. Profiles will differ substantially across a range of visual conditions, and so profiles for each condition can be created in advance. These default profiles will prevent the user having to fill in a form which may be time consuming and stressful. The values contained in the selected default profile can be manipulated subsequently by the user to tune the results.

When this is added to the user's ability to set an essentiality rating of information based on how much time they have to browse the Internet or simply based on how much information they can cope with on a page, the whole package becomes a useful tool. By this means the user is able have just the right amount of information on the page displayed in a form relevant to the severity of their impairment. Indeed, the initial value of essentiality would be one of the parameters. It is believed that through the use of this tool the web will be made easier to use for all user types of visual impairment and will therefore become more accessible to those with disabilities.

The advantage of a tool such as this is that it is generic for all user types, not just those with a visual disability. The tool could be used by, for example a user browsing the web using a PDA. The requirements are the same: the user needs to be selective about the volume of information and may need to manipulate its appearance. The result is that a visually-impaired user will be making use of a tool created for all, as opposed to it being created just for their needs, which can perhaps make them feel included rather than excluded. The latter is the case when companies overtly create alternative versions of their sites (usually text only) for those tacitly deemed less able. In the case of our tool, all users utilise the same URL for each site, however the content of the page is manipulated on its way to the user to suit their individual informational and presentation needs.

2.1 Process Breakdown

The Essentiality and Proficiency Tool is a proxy service that will enable users to pick a user profile (see table I). The range of user profiles available is based on user requirements that have been gathered from our user requirements survey. This differs from Carrira et al's (2004) WebClipping2 as the latter's profiles are based on the system monitoring reading behaviours. In our approach the user will be able to view the content of a web page in accordance with their needs.

Table I: Process Breakdown for Essentiality and Proficiency Tool

Author	Marking-up	The author rates and then marks up essential content.
User	Defining	Allows the user to choose an initial profile description that best suits their requirements.
	Requesting	Allows the user to request a URL, the same one as everyone else uses.
Server/Filter	Capturing	Captures the contents of the web site using standard <i>http</i> requests.
	Processing	Processes web content through the essentiality and proficiency filter.
	Rendering	Displays the information according to the selected display profile.

2.2 Essentiality

On any given web page, there may be some information which is of more use than others. Web sites are often found to contain very little information that is absolutely essential. In other words, the meaning of the site could easily be portrayed in a much smaller amount of information than is actually present. Some elements of the page may have a high information level making it essential for this to be displayed, but other elements are purely aesthetic (such as most of the images on a page) and can be cumbersome for those who have little time and/or bandwidth.

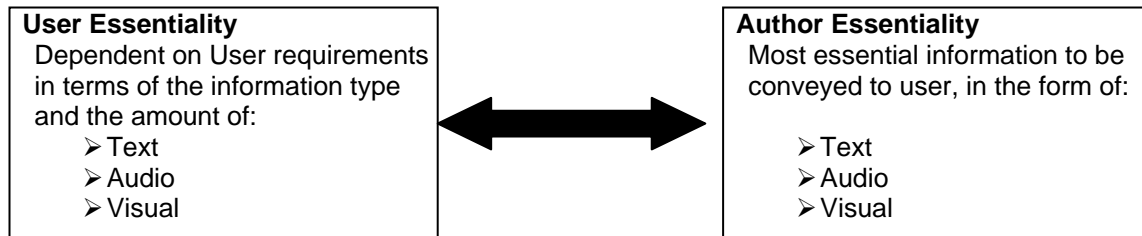
For example imagine if a user were organising a business trip and needed to look up a hotel and required only the most essential information such as location and room rates to be displayed. If the user could set an essentiality level on a website, they could retrieve information much faster and more easily. Users could also be given the ability to set an essentiality rating based on how much time they have to surf the web. For visually-impaired users who operate screen readers, this will mean a reduced need to trail through vast amounts of non-essential information.

The essentiality has a two-fold role (see figure 1). Firstly it refers to the author's mark-up in accordance with what they identify as most essential for the user, when conveying information through their website. The essentiality will be measured as a level from 1 to 10. To start with, Level 1 will include everything, whilst at the other end of the scale Level 10 identifies only the most essential information. Secondly, the essentiality also encapsulates the needs of the user through the user profiles. Although the Web Adaptation technology also transforms web content to the user's needs it does not enable the user to view only the essential information. Furthermore, as stated earlier, all the transformation takes place upon transmission to the user. This is also an important factor when this tool is used to limit the content when, for example, a low-bandwidth connection is in use. In all events the actual source of the web page is left untouched and is delivered to the essentiality filter by means of a normal *http* request. However for the essentiality factor of our tool, the source code will have to be altered by the author to include essentiality tags. In order for pages to be able to comply with current standards and be acceptable to accessibility checkers, the use of

microformatting is proposed. Within that scheme, a given paragraph could be tagged with an essentiality value of 9 by means of

```
<P class="ess9">...</P>
```

Figure 1: Mapping of Essentiality Level



Our research has found that reading and navigating a web page varies for users with different levels of vision. The technology used to view the page imposes different requirements upon its presentation. Screen readers, for example, will move sequentially down the source text of a web page reading as it goes. Users of screen magnifiers will have to scroll around the screen in search of the required content. Instead of seeing the content as whole, as is intended by the author, the user has to work through the content sequentially or randomly, hoping to eventually stumble across what is sought. Users find few visual clues such as colour contrast, font size or position which would help identify what is important and what can be skimmed.

2.2.1 Essentiality in Practice

Here we have a first attempt at an author marking up a live website. A very simple page was chosen, which has a number of distinct areas each of which can be identified as more or less essential. In spite of its simplicity, the exercise illustrates the direction that this approach could take. The site selected was the "contacts" page of Loughborough University's Disabilities & Additional Needs Service (DANS). The decisions on essentiality were based upon the premise of what a blind or partially-sighted person would need to know when trying to contact DANS.

In this case, the content was marked up by hand, although a separate project is examining the use of browser plug-in technologies to aid the author in marking up the content. (In particular, the use of XUL, an XML-type language, within the Mozilla framework has been chosen for initial work.) It should be noted that essentiality levels can be assigned in a nested fashion. A particular paragraph may have a given level of essentiality assigned to it, whilst one sentence within that paragraph is marked as being more essential. Examination of the screen-shots in figure 2 reveals the content delivered at each user setting of essentiality level. At the level that reveals only the content considered by the author to be of greatest importance, the user is presented with simply the name and address of the DANS unit. As the user reduces the level of acceptance, more and more detail is provided, until ultimately the site's entire contacts page is delivered to the reader. It is worth noting that this site is already equipped with features to improve accessibility of the site. Four alternative styles of presentation are available and these become visible at a high (although not the highest) level of user essentiality. It is expected that sites using our Essentiality and Proficiency scheme along with user profiling will not require such facilities in the future. Indeed, our scheme will offer a much larger number of alternative views of the site.

Figure 2: Essentiality in Practice: DANS

Disabilities & Additional Needs Service
Room K1.01 Herbert Manzoni Building
Loughborough University, Leicestershire, LE11 3TU
Tel: 01509 22 2770

(a) with user essentiality set to 10

Disabilities & Additional Needs Service
Room K1.01 Herbert Manzoni Building
Loughborough University, Leicestershire, LE11 3TU
Tel: 01509 22 2770

choose style **no: 1** no: 2 no: 3 no: 4 **no: 5**

(b) with user essentiality set to 9

Disabilities & Additional Needs Service
Room K1.01 Herbert Manzoni Building
Loughborough University, Leicestershire, LE11 3TU
Tel: 01509 22 2770

choose style **no: 1** no: 2 no: 3 no: 4 **no: 5**

For more information contact:

James Kirby - *Head of Service* - Tel: (01509) 22 2769

Sharron Sturgess - *Student Adviser* - Tel: (01509) 22 8339

Dan Doran - *Mental Health Support Adviser* - Tel: (01509) 22 8338

Diane Holmes - *Secretary* - Tel: (01509) 22 2770 - Fax: (01509) 22 3933 - Email: DANS@lboro.ac.uk

(c) with user essentiality set to 6

Disabilities & Additional Needs Service
Room K1.01 Herbert Manzoni Building
Loughborough University, Leicestershire, LE11 3TU
Tel: 01509 22 2770

[Staff](#)
[Students](#)
[Who We Are](#)
[Disabled Students Allowance](#)
[Current Developments](#)
[Mental Health Support](#)
[Sitemap](#)

choose style no: 1 **no: 2** no: 3 no: 4 **no: 5**

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(d) with user essentiality set to 4

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Room K1.01 Herbert Manzoni Building
Loughborough University, Leicestershire, LE11 3TU
Tel: 01509 22 2770



DANS





- Staff
- Students
- Who We Are
- Disabled Students Allowance
- Current Developments
- Mental Health Support
- Sitemap

choose style no: 1 no: 2 no: 3 no: 4 no: 5

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 Website maintained by: DANS@lboro.ac.uk

(e) with user essentiality set to 1 (revealing the original page)

2.2.2 Implications for the Author

The Essentiality and Proficiency Tool requires the consent of the web site author to mark up the content with the essentiality rating. The author may well question what will be gained from undertaking this extra process. The benefits are numerous:

- The prime benefit for the author is there is no need to develop alternative sites such as a text only site, as the user is able to manipulate the volume of information and the type of information. Furthermore the higher the essentiality the less aesthetic information and more core textual content is displayed. This, in turn, enables all users to find the important information and could lead to the user staying longer with the site.
- Authors may be prepared to rate their content because the tool has a universal user group and hence a wider audience for the web site.
- The author may wish to give the user as much information as possible about the product/service. However the author has specialist knowledge and therefore can ensure that, through essentiality rating, the most essential information is relayed to the user.

The downside to the tool has also been considered. The format initially developed by the author may be modified during the user's viewing. Users will view the site in a manner that meets their requirements and not how the author intended. However it can be argued that this is a small price to pay for a site that is accessible to all. Further, as highlighted above, the author will not have to develop alternative version of the site for accessibility. One further area of concern is that revenue earned from advertisers may be at risk if advertisements are excluded from a give user's view of a page.

2.2.3 Web Authoring Guidelines

Guidelines will need to be set for a standardised essentiality rating which will ensure that pages are compliant for use with the tool. Furthermore this will enable the users to learn how much content is associated with each essentiality rating and find one that fits their requirements.

Shifting the assessment of what is 'essential' from the user to the author, still leaves the problem of exactly how to model the essentiality. Already proposed is the simple solution of ranking sections of content with levels from 1 to 10; table II demonstrates. For the initial phases of this project the web site for a London restaurant, Quaglino's, deemed by the authors to be inaccessible, was modified to present a technical demonstration of essentiality allocation.

Table II: Essentiality mapping

Essentiality Level	Description of content	Domain Example
<P class="ess1">...</P>	Purely aesthetic content	Aesthetic images/icons
<P class="ess2">...</P>	Content that is mostly aesthetic, and of little or no information value	Photographs that are textually explained
<P class="ess3">...</P>	Content that has little information value	Images of the restaurant building
<P class="ess4">...</P>	General information 'take it or leave it' content	Other services offered by the venue
<P class="ess5">...</P>	Information that could be of importance to minorities	Private dining facilities
<P class="ess6">...</P>	Information important to some people	Music played at the venue
<P class="ess7">...</P>	Information important to most people	Bar facilities
<P class="ess8">...</P>	Information beyond the basics	Menus
<P class="ess9">...</P>	Important information for all	Opening times
<P class="ess10">...</P>	Vital information on the page; the raison d'être for the page, if not the site	Address and contact details

2.3 Proficiency

Hook (2004) defines proficiency as the rendering capabilities of the device being used, e.g. whether it is a desktop PC, a laptop, a PDA or a mobile phone. For example due to the physical size of the displays on mobile phones and PDAs there is limited volume of content that can be displayed to the user. This leads to a measure of the 'proficiency' of the device. Further, a device, even a PC, on the end of a low bandwidth link could be thought of as having a low measure of proficiency. The same logic can be applied to the ability of a given visually-impaired user to accept or perceive particular content or formats. Different forms of visual-impairment impact on users in very different ways. For example, cataracts produce low-contrast vision, with associated loss of resolving power and sharpness. People suffering from glaucoma will see an image only in the central field of vision. The opposite is true of those with macular degeneration, where only the area surrounding the axis is visible. Those with symptoms of diabetic retinopathy have blotchy vision. As a result, it is possible to identify particular solutions to many of these forms of vision-impairment. In doing so, we have come up with a near-parallel solution to that of display or bandwidth limitations.

3 The Importance of User Profiles

The importance of generating a range of user profiles lies in the ability for a product to be accessible to a range of users rather than one specific group, as is stated by Sugiyama (2004). Although retro-fitting is constantly criticised by specialists, there is a need for it, as the Internet has been present for a number of years and is constantly developing in terms of audio, visual and graphics content and ability. Furthermore although accessibility standards, such as WCAG 1.0, have been taken up by a number of governments as part of their legislation, not all developers are developing accessible sites. The retro-fitting of these websites will take a number of years to ensure that they are all accessible.

In contrast, studies conducted by Gunderson (2004) have shown that the severity of one's visual condition affects the time taken to complete simple tasks on the web. Users were split into three groups. In the allocated time the control group of non-disabled users completed 75% of the tasks, the low vision group completed 25% and the blind group completed 12.5%. The results reflect the current poor state of design of web browser technology and web resources for those with disabilities. This study identifies that users with different levels of visual impairment have different needs and abilities, hence the requirement to create profiles for categories of these diseases.

As highlighted in Dhiensa et al (2005), this leads to the importance of the Proficiency and Essentiality Tool so that users can access a wider range of sites. To provide easy starting points that cater for the needs and requirements of a larger user base, the tool will have a number of preset user profiles that have been developed from the survey carried out to the capture user requirements.

3.1 User Requirements Survey

As part of our preliminary research we conducted a survey to gather user requirements from visually-impaired users for the Essentiality and Proficiency tool. The aim was to find out what difficulties were being experienced and what measures could be taken to make navigation of a web page easier. The data was required from different visual impairments to build up profiles through the collection of formatting preferences such as font styles, colour schemes etc.

The survey consisted of one-to-one interviews with twelve participants from the RNIB Vocational College, based in Loughborough, UK. The RNIB College educates blind and partially-sighted students in vocational skills and this enabled us to survey people of different ages with a broad range of visual impairments. Questionnaires were constructed and sent out to various mailing lists. The members of the mailing lists were technology-orientated and therefore we were able to gather information from users with a variety of user experience.

The interviews highlighted the improvements the Internet had brought to the lives of users with visual impairments (see Case Study 1). However it also brought to light the limitations that deter some users from using the Web (see Case Study 2).

Case Study 1

Mick is a 54 year-old web developer with no useful sight. Until 1995 he was unemployed and housebound. His daily lifestyle included doing household chores and once a week he attended a drop-in centre for the disabled. During 1995 Mick was introduced to IT with the aid of assistive technology in the form of a screen reader (Jaws). Mick learned new skills and gained an independence that he thought was not possible.

With the aid of the screen reading software, Mick has gained vast experience in IT. Mick now develops web sites, checks other sites for accessibility and also teaches other visually-

impaired students. Although Mick has made these strides forward, it does not mean that he is being served as best as he could with his assistive technology. For example, the inaccessibility of some websites leads to the screen reader vocalising all the link information.

Case Study 2

Alice (49) is a secretary and has no useful sight. Alice is proficient in the use of IT. Using a screen reader Alice creates spreadsheets, word documents and regularly checks and sends emails as part of her work. However Alice avoids using the Internet due to the confusion and the visual clutter she experiences. Alice dislikes having to read vast amounts of information as she feels overwhelmed before she even reaches the part that she needs.

Case Study 2 reveals that even though online technologies have been developed to increase social inclusion, they are often failing due to their inaccessible nature. Case Study 2 highlights how the sheer volume of content deters Alice from using the web.

There were 38 replies to the questionnaire survey, showing that:

- 42% of the respondents admit that their primary difficulty in using the web was the overload of information on a page. The second highest difficulty was visual clutter at 23%. These figures suggest that there are a significant number of visually-impaired Internet users who find it difficult to navigate the web as there is too much content on a page and the information becomes hard to digest. (This was also evident in Case Study 2.)
- 69% of those questioned said it would be useful or very useful to be able to manipulate the volume of information on a web page, and 77% agreed that reducing the amount of information displayed on a page according to the essentiality would ease their use of the Internet. This translates into a significant proportion of respondents in favour of the essentiality element of the tool.

3.2 User Profiles in Practice

Table III shows an example of the different user groups within the field of visual impairment. Taking these as a first set of profiles we narrowed down the requirements from the survey to create more intensive profiles (table IV) for the prototype.

Table III: Visually-impaired User Profiles

User Profile	Strength of Visual Impairment	Assistive Technology in Use
1	Partially Sighted	Large font Contrasting background
2	Mild/Moderate vision	Screen magnification software
3	No vision	Screen readers Refreshable Braille displays

Table IV: User profiles from real users

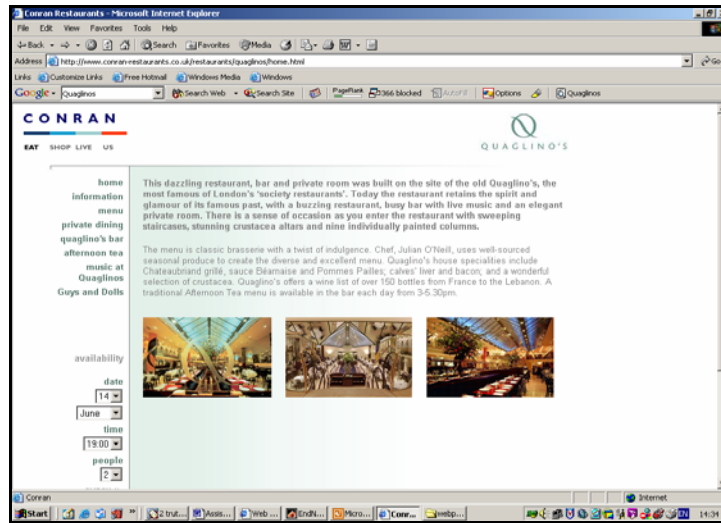
User Profile 1	Profile parameters
User has a slight visual impairment Changes formatting preferences in the browser Frequent user of the Internet Finds that there is too much information on a page	Black text on a pastel background Font size 14, font style Arial 1-2 images can be meaningful Essentiality level 4-5, providing a reduced level of content compared with the full page
User Profile 2	
Mild visual impairment Has difficulties with font size Screen magnification user Uses Internet once a week Difficulty understanding images when using desired setting of screen magnification	White text on black Large font size, say 20 point Only essential images Font style Arial Essentiality level 5-6, limiting the volume to a 'need-to-know' level
User Profile 3	
No useful vision Screen reading software user Frequent user of the Internet Would prefer no images, as incorrectly/unlabelled images are useless Flash incompatible with JAWS	Black on yellow Text size compatible with JAWS No images Essentiality level 7- 8, providing only near-vital information

3.3 User Trials

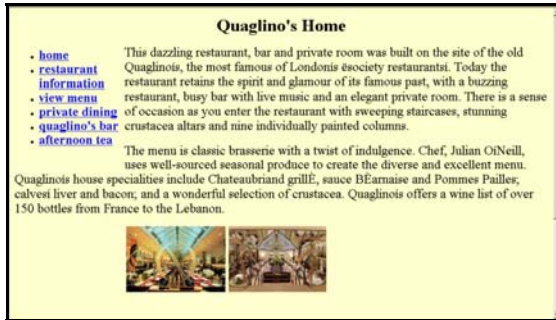
The user testing of the prototype was limited to four participants. We requested a sample of participants from the initial user requirements survey to test the tool as it would better validate the work. The group represented a range of ages, gender and visual impairments. The prime purpose of this testing was to see if the users would choose the user profile that had been created based on the level of visual impairment that they have.

The participants were given four quite different renderings of Quaglino's web page for them to browse through using their respective assistive technologies. The original and the three profiled pages can be found at figure 3. This is a web site promoting a restaurant in the heart of London and represents a mixture of graphics and text in different styles. Five minutes of browsing was allowed per page. Once the participants had seen all four pages they were questioned.

Figure 3: Quaglino's original web page, shown altered to each of the three sample profiles



(a) Quaglino's original web page



(b) User Profile 1



(c) User Profile 2



(d) User Profile 3

Table V show that each user had very different requirements, which may even change over a period of time. One participant explained how they needed to change the font size after looking at the screen for a short period, as their eyes became tired and it became harder to view the content. Furthermore the preferences identified by the participants at the interviews had changed at the testing stage. Hence it appears that the participants would like the option to manipulate format as different factors affect the user requirements.

Table V: Test Results

	Participant 1	Participant 2	Participant 3	Participant 4
Intended profile	Profile 3	Profile 1	Profile 2	Profile 1
Preferred profile	Profile 3	Profile 3	Profile 1	Profile 1
Assistive technology used	Screen reader	Enlarging the text in operating systems settings	Screen magnification	Screen magnification
Differences apparent between the pages	Less text Information easily found	Less information displayed Colour change Fewer images	Less information Change in colour scheme	Less content Greater colour-contrast on Profile 2 Profile 3 is text only
Reasons for preferred site	Likes the amount of text on the Profile 3 but would also like images that could be enlarged as has some available sight	Very clear and concise Comfortable to read	Text is easy to read Profile 3 would strain eyes and text not bold enough	Good contrast balance Suitable amount of information
Other comments	As long as the text is read by the screen reader have no text size preferences	As time elapses, text size has to be increased as eyes become tired	Would like the ability to enlarge the images	Would like to enlarge both the images and text

4 Conclusion: The Benefits

Assistive technologies have always been developed for specific groups and have therefore had smaller user bases. Stephendis (2001) argues that as the development is group specific, it too lacks universal appeal. Even though the Essentiality and Proficiency Tool has been modelled upon users with visual impairments, we foresee the tool being of universal appeal. The adapting nature of the device means that users with dyslexia or even able bodied novice web users are able to reap the benefits. A separate study has been undertaken to gauge the Essentiality and Proficiency Tool's effectiveness for novice web users.

5 Ongoing and Further Work

The work reported here concentrates on material derived from static web pages. There is a need to consider how the Essentiality and Proficiency Tool can be applied to pages created dynamically. At first sight this appears difficult, but as many dynamic pages are derived by entering dynamic text, such as results from calculations, into what is effectively static text, the problem is not insurmountable. We would need to ensure that appropriate essentiality

rating of the static content is provided, having given due regard to the presentation of the final page. A separate project is investigating the principles involved here.

A further project is under way to develop an essentiality editor, which will ease the burden on the author by providing an automated way of adding tags. The idea is to allow the author to simply highlight a passage of the site and then assign an essentiality value to that passage. With added previewing of the content at varying essentiality levels, the author is relieved of the burden of having to hand-code the essentiality levels into the source.

The next phase of the main project is to test the live website with visually impaired users. A simple filter, based upon PHP has been produced and so suitably marked up material can be delivered to users specifying their preferred level of essentiality.

References

- AccessIT: 2004, 'How does accessibility differ across operating systems?' In: <http://www.washington.edu/accessit/articles?15>, National Center on Accessible Information Technology in Education.
- G. Brajnik, D. Cancila, D. Nicoli and M. Pignatelli: 2005 'Do text transcoders improve usability for disabled users?'. Proceedings of the 2005 International Cross-Disciplinary Workshop on Web Accessibility (W4A), Chiba, Japan, pp 9 - 17.
- R. Carreira, J. M. Crato, D. Goncalves and J. A. Jorge: 2004, 'Evaluating adaptive user profiles for news classification'. International Conference on Intelligent User Interfaces, Funchal, Madeira, Portugal, pp 206 - 212.
- J. Clarkson, R. Coleman, S. Keates and C. Lebbon: 2003, 'Inclusive Design: Design for the whole population'. Springer.
- J. Dhiensa, C. H. C. Machin, F. Smith and R. G. Stone. 2005, "Optimizing the User Environment: Leading Towards an Accessible and Usable Experience". Accessible Design in the Digital World Conference 2005, Dundee, UK.
- J. Dhiensa, C. H. C. Machin and R. G. Stone. 2005, "Assistive Technology: Going Beyond the Disability". Include 2005, London, UK.
- J. Gunderson: 2004, 'W3C user agent accessibility guidelines 1.0 for graphical Web browsers'. Universal Access in the Information Society3 (1), pp 38 - 47.
- S. Gupta and G. Kaiser: 2005 'Extracting content from accessible web pages'. Proceedings of the 2005 International Cross-Disciplinary Workshop on Web Accessibility (W4A), Chiba, Japan, pp 26 - 30.
- V. L. Hanson: 2004, 'The User Experience: Designs and Adaptations'. International Cross Disciplinary Workshop on Web Accessibility, World Wide Web Conference (WWW2004), New York City, USA, pp 1-11.
- K. Kottapally, C. Ngo, R. Reddy, E. Pontelli, T. C. Son and D. Gillan: 2003, 'Towards the Creation of Accessibility Agents for Non-visual Navigation of the Web'. ACM Conference on Universal Usability, Vancouver, Canada, pp 134-141.
- A. Lee: 2004, 'Scaffolding Visually Cluttered Web Pages to Facilitate Accessibility'. AVI, Gallipoli, Italy.
- D. Pierrakos, G. Paliouras, C. Papatheodorou and C. D. Spyropoulos: 2003 'Web Usage Mining as a Tool for Personalization: A Survey '. User Modeling and User-Adapted Interaction 13 (4), pp 311 - 372
- K. Sugiyama, K. Hatano and M. Yoshikawa: 2004, 'Adaptive web search based on user profile constructed without any effort from users'. 13th International Conference on World Wide Web, New York, USA, pp 675 - 684.
- UMIST:2004, 'Webbie'. UMIST, Manchester, UK.

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