

# Employing Universal Design in an Internet City Guide – Case Study of an Evaluation and Retrofitting Process

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## ABSTRACT

A case study on evaluating an internet city guide for accessibility and Design for All is presented, and retrofitting considerations are reported. The study can serve as an early example for the processes to come according to the new German legislation demanding equal access to information systems for people with disabilities. Some conclusions on further standardization needs are added.

## 1 Universal Design or Accessibility?

Bringing the information society to life while avoiding a digital gap takes a lot of activities, one of which is to make user interfaces usable for all people – which means fostering universal design, or Design for All. Where universality fails, some groups of people may feel that they are denied access to information systems. Consequently, the access problem should be addressed and fixed – which means caring for accessibility. Most effectively, accessibility is employed in a way that enhances the universality of the user interface. Not very effective are special accessible areas “for the disabled” like the text-only-pages found in some internet sites, which most often cannot provide for equivalent, up to date information. In short: while accessibility refers to addressing problems, universal design is the solution. In the evaluation work reported here, we most often are talking in terms of accessibility, while universal design is the leading idea for recommended developments.

## 2 Accessibility History of the Hamburg Homepage

The Hamburg Homepage [www.hamburg.de](http://www.hamburg.de) is a virtual marketplace for the region, containing a city guide, a directory to regional businesses and the official homepage of the state, the Free and Hanseatic City of Hamburg. The site is run by a company in public-private partnership. The target group includes all citizens – the perfect object for a design for all study.

In the past, accessibility for blind and visually impaired computer users had been a goal for some singular parts of the information system. DiBIS, the official citizens' online information service offered by the state administration of Hamburg, was originally designed to include braille bar users to their audience. The DiBIS management was very aware of accessibility concerns since the time when the system was being ported from BTX to internet in 1996. From this time, BIT GmbH, a local competence center for disabled computer users, got involved as an accessibility consultancy.

In spring 2001, the new [hamburg.de](http://www.hamburg.de) homepage was released (see figure 1), which would integrate all the up to then separate parts of the information system. Accessi-

bility concerns had not been included in first place, but were continually put on the agenda by different interest groups. By fall 2001, when the federal legislation on equal rights for people with disabilities was approaching, an evaluation for accessibility was commissioned. As a result we can present here an early example of the procedures to come, accomplished ahead of obligation by law.



Figure 1: The Hamburg Homepage is laid out in the typical three column 'portal' design.

## 3 Evaluation for General Accessibility

The evaluation was aimed to detect general accessibility problems concerning the main user interface of [www.hamburg.de](http://www.hamburg.de), as been in October 2001. It should comprise a weak points analysis as well as pragmatic suggestions for retrofitting. A certification procedure was not included.

### 3.1 Target Groups

Target groups of the study were people with disabilities, especially blind and visually impaired and motion impaired people who are dependent on special computer access devices. Next, the elderly came into account, who have certain visual problems and usually cannot afford the latest equipment. Some aspects would be applicable to people with seizure diseases. People with

impaired hearing did not come into account, as there were no sound elements in the main user interface. We felt that at the time being we could not evaluate for deaf people and people with learning disabilities, who are dependent on plain language. The outcomes of our study would also benefit users of mobile devices like PDA.

### 3.2 Testing procedure

Accessibility requirements on internet information systems were released in 1999 by W3C (World Wide Web Consortium) under the title of WCAG 1.0 (Web Content Accessibility Guidelines), which made up the basis of our evaluation. From ISO 9241 and German DIN standards we took some specifications related to legibility of fonts and to answering time handling. We felt these standards on ergonomic office software being applicable to the needs of our target groups where more specialized guidelines are still missing.

Our testing procedure was made up following the "Evaluating Websites for Accessibility" draft guidelines released by W3C in August 2001, with some adaptations. We listed a sample of actions and inner links aimed to give a representative picture of the user interface, while pages presenting multimedia content were left out of the study. Testing equipment comprized special browsers and testing tools as recommended. We found it useful to add a 3 years old 15" Monitor to our equipment in order to easily detect legibility problems. A 56 kbit modem was included for answering time measurements. The Opera browser was particularly useful to report Javascript problems. Evaluation was done according to the checklists, with additions as mentioned above.

It should be pointed out that, at the time being, testing procedures are not at all standardized. The mentioned guidelines and checklists provide the framework for an expert's study, needing a considerable amount of practical experience to be completed.

### 3.3 Results

The outcomes of the study can be reported here only with regard to some features of general interest.

#### 3.3.1 General Structure

The Hamburg Homepage is laid out in the typical three column 'portal' structure (see figure 1), which can be seen a lot among websites collecting a multitude of items and topics under a wide umbrella. Addressing a huge database, the content management system seems to be stressed to its limits, showing some answering time problems every now and then. Another problem might be seen in the broad content displayed on top level screen, resulting in a screen stuffed with small fonts and no space left for individual adaptation needs.

#### 3.3.2 Strong Points

The user interface shows a consistent structure, proving an awareness for usability. Navigation is mostly done by text links, not many image links are to be han-

dled. Javascript is used additionally, not basically, on main navigational items. Animation is no operational part of the information system.

The strong points offer a good basis for improvement. As to top level navigation, access for screen readers and special browsers is basically ensured, or can easily be employed.

#### 3.3.3 Weak Points

Text equivalents for images are often, but not always supplied. Consequently, some parts of the information system, such as email registration, foreign language pages, pages referring to sightseeing, and further information to a given topic, cannot be addressed by screen readers and text browsers.

Moving images, i.e. animated gif or flash, are not accessible and should be avoided, as they might cause health problems for people with seizure diseases, and might distract screen magnification software. Animation is used on advertisement banners only.

Javascript is used on the search facility's main input field in a way that noscript browsers are not affected, but browsers using the Javascript ECMA standard would ignore the input field. Some items of second level navigation do not work without Javascript, such as the detailed-search facility, the sightseeing area. As a result, these facilities are not accessible to users of screen readers and special browsers.

Font sizes are conveyed in absolute values, not in relative values as would be necessary for adaptation by people with visual problems. Font sizes are set too small in some areas, so that they would not pass a test for ergonomic workplace equipment. Consequently, the visually impaired and the elderly would encounter some legibility problems.

The three column layout makes it difficult for screen reader users to get an overview. Adding to the problem are missing structural markup such as header elements. Blind computer users may find the information system basically accessible, but not easy to use. The same applies to keyboard users.

#### 3.3.4 Overall Recommendations

As the given structure is basically accessible and allows for improvement, it would not be necessary to employ a text-only site as an interim solution. Items of top level navigation can be improved by simple means, i.e. adding ALT tags and correcting Javascripts, thus giving access to users of screen readers and special browsers. Items of second level navigation, leading to singular parts or advanced usage of the information system, can be made accessible by more sophisticated noscript handling. Not easily fixed are the problems referring to legibility and usability, which would afford a redesign of the overall layout.

As an outcome of the study, we recommended to fix simple problems a.s.a.p., and to join the more advanced

accessibility or universal design considerations to the objectives for future redesign.

#### 4 Retrofitting Considerations

As there were no obligation by law nor a fixed level of accessibility to be completed, retrofitting considerations were to be treated as a business decision at free will. In order to facilitate the decision making process, our recommendations were set up in a priority list of items to be fixed a) immediately, or b) in the frame of a major relaunch, or c) as seen fit. Ranking was done not only according to the checkpoints for the different WCAG 1.0 conformance levels, but also according to considerations of feasibility and long-term value. Details had to be discussed with technicians and managers of the site, as more intimate knowledge of given structures was necessary.

Feasibility of retrofitting may be seen as related to cost. A clear limitation is set by the tools in use for production, as far as high-priced investments are concerned. The content management system, as an example, would not set empty ALT tags for spacers, so this method aimed at hiding spacers from text browsers had to be omitted. Changing font size definitions from absolute to relative values may turn out to be quite costly, as all stylesheets and templates have to be tested anew – a process which you would call redesign rather than problem fixing, and which consequently was ranked down. Our discussion aimed at finding items, which could easily be changed, without inflicting the whole structure, so that an improvement on accessibility could be accomplished at low cost. Not only level A, but also AA and AAA items (in terms of WCAG 1.0 conformance levels) were identified to be easily fixed.

Where conflicting goals occurred, a more precise rationale was often missing. As an example, the site managers denied our recommendation to avoid animation, as they would not easily impose limitations on their advertising customers. At the state of the art, we were not able to indicate a clear ranking of this item from accessibility considerations. While the checkpoints list animation under a “until user agents” clause, evidence of distractions caused by animation could not be given from new studies. Should it come to obligation by law, testing procedures and ranking ought to be consolidated to a level of standardization as known from the German

TÜV label for safety checks. The managers of ham-burg.de pointed out that such a standardized and officially installed certification procedure would be crucial for their security of investment.

#### 5 Conclusion

As the process of employing accessibility to electronic information systems is in its beginnings, some necessary structures are still missing. The above-mentioned experiences from an early evaluation and retrofitting process show the need for development especially in the area of standardization. At the state of the art, evaluation procedures are operational for experts, not for practitioners. Neither are levels of completion agreed upon, nor are testing procedures worked out, nor ranking criteria assured. Yet site managers ask for a reliable certification procedure as a basis for their business decisions.

While this study was focussed on addressing and fixing accessibility problems, the goal of universal design, which was the leading idea of recommended solutions, would need more elaboration. Information designers can do an important job by presenting models for universal design, so that accessibility problems may be avoided in future information systems.

#### 6 References:

- Lange W. (1991), Kleine ergonomische Datensammlung, 7th edition, Bundesanstalt für Arbeitsschutz (Eds), Verlag TÜV Rheinland, Cologne.
- DIN EN ISO 9241 (1997-2002), Ergonomic Requirements for Office Work with Visual Display Terminals, Beuth Verlag, Berlin.
- W3C Web Accessibility Initiative (1999), Web Content Accessibility Guidelines, <http://www.w3.org/TR/WAI-WEBCONTENT>.
- W3C Web Accessibility Initiative (1999), Checklist of Checkpoints for Web Content Accessibility Guidelines 1.0, <http://www.w3.org/TR/1999/WAI-WEBCONTENT-19990505/full-checklist>.
- Akoumianakis D. and Stephanidis C. (2001), Universal Design in HCI: A critical review of current research and practice, Paper presented to the CHI 2001 Conference on Human Factors in Computing Systems, Seattle, 31 March - 5 April 2001. <http://www.ics.forth.gr/proj/at-hci/chi2001/files/akoumianakis.pdf>
- W3C Web Accessibility Initiative (2001), Evaluating Web Sites for Accessibility, <http://www.w3.org/WAI/eval>.