

Accessible Design for Websites

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The World Wide Web is the most significant technology step concerning the publishing and gathering of information since the establishment of radio broadcasting. It regards itself the most liberal, open and democratic architecture between transmitter and receiver; nevertheless, about 10 % of willing and technically capable users are almost completely excluded from these possibilities, because the web cannot speak.

This paper discusses requirements, problems and solutions for publishers to make their part of the net more easily accessible to visually handicapped users. It focusses on the use of technical standards such as XML, XHTML and CSS and proposals provided by organisations and institutions e.g. the W3C, the Aktion Mensch and the Federal Government to simplify the use of websites. Finally, disadvantages which may arise in consequence are discussed.

HASSO-PLATTNER-INSTITUT
für Softwaresystemtechnik GmbH



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1 Introduction

The Internet Originally the internet was designed to simplify the exchange of scientific papers and to interconnect those who wrote them. Meanwhile it is an open platform for everyone who wants to contribute knowledge. It is an important media for enterprises to advertise their products, the fastest way to gain news and the easiest and cheapest way to communicate worldwide. Nowadays you can even buy your christmas presents in the World Wide Web. Somehow the internet formed a parallel universe with banks, shopping malls, parks, libraries and kiosks in everyones living room.

The Users Everybody should be able to participate in this world wide community. Since the web offers these possibilities without the need to leave your desk it is the most significant improvement for impaired people. The obstacles for those with impaired mobility and senses which cause them to avoid contact in normal life should not be present in the internet. These obstacles are actually the reason why they are called disabled or impaired. Because of the anonymity of the web they do not have to fear segregation or problems. For that reason the internet has become an earthly paradise for them. They can do their shopping, financial activities and they can talk to everyone they want to.

But this is only theory. In fact, the internet is "optimized", as designers call it, for the majority of the users. The currently used techniques are based on the most popular operating system and browser. They are designed for those who have normal sight and can use a mouse and keyboard. They do not take account of the needs of minorities.

1.1 Definitions

Usability vs. Accessibility The easiness and simplicity for everybody to access web content and systems of all kinds is called accessibility and is regarded as a subset of usability which is the easiness of use. Accessibility corresponds to ergonomics but still lacks a clear definition. Therefore the process of standardization is hampered.

The basis for the mentioned ideas and concepts will be the following denotation of accessibility: (Web) accessibility describes the design of (web-based) information and communication systems which allows the use without barriers or limitations while nobody should be excluded. The main focus is set to impaired and disable users, whereas accessibility covers more aspects than just conformance regarding handicaps. Furthermore able-bodied may also use techniques which require certain assistance provided by the publisher. [2]

Accessibility and usability are measures with a certain granularity. A strict differentiation between accessible and inaccessible web content is impossible. Therefore the World Wide Web Consortium (W3C) - the institution publishing standards for the world wide web (WWW) - developed different degrees of accessibility by using a set of checkpoints, which are provable by either human or machine. These conformance classes were defined in the Web Content Accessibility Guidelines 1.0 in 1999 [4]. Because of

inconsistencies and the experiences made while utilizing them, the W3C is preparing a second version, but the design of this recommendation is still in progress.

The "Bundesministerium des Innern" (ministry of the interior) has set up an ordinance regulating the accessibility of governmental web-based information and communication systems which is based on the WCAG 1.0 [1]. It claims every website of governmental organisations to fulfill the defined guidelines until the end of this year. Websites which have been launched or relaunched since the entry into force and those addressing impaired or disabled people have to fulfill them already.

Validity Validity is an absolute measure. It describes whether or not a document conforms to the standards it refers to. Validity is easy to check with the help of applications and web services. The W3C offers this service to everybody on its website. Only by achieving validity the platform and user-agent independence of documents can be granted which will be discussed later on.

2 Requirements

User Agent Independent User agents are tools used to browse through the web. Different people have different needs regarding their user agent. The majority does not need to reflect on that issue. Their operating system (Windows) brings an integrated browser (the Internet Explorer), so they are able to use the web like they expect it.

But not everybody is satisfied with this browser, since the IE came up with lots of security problems. So people who are aware of that switched to different browsers. Those who use other operating systems might also use a different browser.

Machine-Readable Impaired people have even different needs regarding their user agent. If they are blind or visually impaired, their user agent should read out the text or they use a braille display to read on their own. If they are motorically impaired, they might not use a mouse or keyboard, but control their computer with a joystick or something similar. If they are of advanced age, they would like to change the font-size or the colors, because otherwise they are unable to read the texts.

Valid Regarding current websites the most obvious requirement to accessible design seems to be one of the most difficult. Only if the markup of the site follows all rules of the standard it uses, one can guarantee the correct presentation on the side of the user. In practice lots of errors are embedded in most sites to force a certain design in a special browser. Other user agents might very likely stumble across these mistakes and render the markup differently. So validity is a precondition for accessible websites, but validity cannot be the only qualification for an accessible design.

In consequence, the markup of websites should mind all these possibilities to guarantee the accessibility for everybody. But that is not as difficult as it sounds, if the designer, programmer and author follow some rules. The role of designer and author will not be discussed in this paper, since their work cannot be easily assessed. The evaluation of the comprehensibility of a text is always subjective as well as the legibility of a combination of font and color. But the steps to take by a programmer are standardised by different institutions and organisations and are generally accepted by experts.

3 Solutions

The crux of most websites concerning accessibility is the affinity to graphical browser. These sites are marked up to render nicely in these browsers but they do not mind structure. Tables are used to arrange content, images contain important textual information and text is not structured logically consistent. If you browse these sites with a screen reader you will be unable to gather the desired information.

Only if markup is used in the right manner, screen readers and other alternative user agents are able to present the content in an adequate way to the user. The prerequisite for such meta information is XML. This technology was developed by the W3C and is the basis for lots of modern web techniques. XML is very easy to read and write and therefore has made a significant development over the last years. Because of its open architecture it can be used in many different ways for many application areas. Languages based on XML are called dialects. Two of them can provide a solution for the aforementioned requirements concerning accessibility.

3.1 XML in a nutshell

XML documents have a defined structure. Each document uses a predefined document type or schema which provides a finite number of tags to mark up information. These tags can be nested and could have defined attributes. Because the definition of new document types or schemas is not restricted to any institution, the use of XML can easily be adapted to the precise requirements.

A sample XML-File [3] would look like the following. `slideshow` is a tag and `title`, `date` and `author` are its attributes. `slide` is a child-element of `slideshow` and has children itself (`title` and `item`).

```
<?xml version='1.0' encoding='utf-8'?>

<!-- A SAMPLE set of slides -->

<slideshow title="Sample Slide Show"
           date="Date of publication"
           author="Yours Truly">

  <!-- TITLE SLIDE -->
  <slide type="all">
    <title>Wake up to WonderWidgets!</title>
  </slide>

  <!-- OVERVIEW -->
  <slide type="all">
    <title>Overview</title>
    <item>Why <em>WonderWidgets</em> are great</item>
    <item/>
  </slide>
</slideshow>
```

```
<item>Who <em>buys</em> WonderWidgets</item>
</slide>
</slideshow>
```

Furthermore it shows that opening tags (`<abc>`) have to be closed (`</abc>`) again and that empty tags may be shortened (`<abc/>`). This example should enable the reader to comprehend detailed information in the following two chapters.

3.2 XHTML and CSS

XHTML In most of today's web projects, design and content markup are all mixed up. With the help of XHTML and CSS they can be separated again to allow the combination of attractive and powerful design and well structured content. XHTML is the XML dialect corresponding to HTML - the old-fashioned way to markup web content. The tags defined by XHTML provide the author and programmer with a possibility to mark different content elements in an adequate manner. In contrast to HTML it does not allow tags containing design instructions.

In consequence the contributor is able to publish correctly marked up text and user agents are able to render the content optimally. A good example for these tags and the advantages could be abbreviations. In XHTML they are marked up as the following.

```
<abbr title="for example">e.g.</abbr>
```

Screen readers are now able to read the text correctly by replacing the text between the `abbr`-brackets by the `title`-attribute. Another example could be the heading. XHTML knows 6 hierarchically ordered heading tags (`<h1>` to `<h6>`). If they are used correctly, the text can be structured comprehensible. The author is able to mark head and body within tables, he can point out quotes and definitions and he can simplify the use of forms. Only `<irony>`-tags are missing.

XHTML can also provide additional information for keyboard control. Elements can be assigned with `tabindex`- and `accesskey`-attributes to influence the navigation without a mouse. Accesskeys have the same functionality as keyboard shortcuts in applications, but unfortunately the key assignment is not yet standardised.

CSS But with XHTML only every page would look the same, since it contains no design information. The look would be totally determined by the user agent, but this is not viable. So a second file has to contain the layout information. This is where CSS comes into play. With CSS, the designer is able to determine the way how the site should be rendered in graphical browsers. One can add background-images, colors and font-types and -sizes, margins and frames. Not only visual layout can be specified, but also instructions for screen readers can be given. One could assign a male voice to headings, a female voice to content and a child's voice to citations. But unfortunately this information is not yet interpreted by screen readers.

Finally every layout, which could be achieved in the old manner, can also be realised with the help of CSS. In fact CSS is even more powerful. All modern browsers are able

to interpret XHTML in combination with CSS so there should be no reason for not using these techniques.

3.3 RSS

RSS follows a different approach of bringing information to the user. It is not as flexible as the aforementioned couple, but in some cases much easier to use. RSS defines an interface to publish news and articles in a standardised way. It is a technology which can only exist besides the normal web, since it does not provide any layout information.

It only brings so-called feeds which contain the latest news or publications of the site. The way how they are presented to the user is determined by the RSS Reader he uses. In most cases it uses a simple style sheet to render the information. The whole navigation within the feed is provided by the Reader.

RSS only knows some tags to markup the content. Articles are grouped in channels. Each channel has a `title`, `description` and `language`. The articles themselves are called `item`, while each one has a `title` and a `description` which is the literal content. So it is clear that RSS can only be an additional offering by contributors for the user, but for the latter it is much easier to personalize the presentation of the content.

```
<?xml version="1.0" encoding="UTF-8"?>
<rss version="2.0">
  <channel>
    <title>Fachenglisch - Test Feed</title>
    <description>This feed is only for testing.</description>
    <language>en-UK</language>
    <item>
      <title>Don't Panic</title>
      <author>schmidt</author>
      <description>I will be finished soon</description>
    </item>
    <item>
      <title>Demonstration</title>
      <author>schmidt</author>
      <description>This example should demonstrate the
                    possibilities of RSS and its
                    limitations.</description>
    </item>
  </channel>
</rss>
```

Table 1: RSS Example File

4 Conclusion

4.1 Possibilities

Considering the needs of all users could enable the world wide web to reach its own goals. It would not differentiate between users and could be a great improvement for impaired and handicapped people. The steps towards an accessible web are still challenging but not impossible to take. The main issue is to inform the responsible ones about the problems and needs of their users and the possibilities to overcome these obstacles.

Along the way the websites will be machine-readable, so automated user agents like search engine spiders have a better chance to do their work. A correctly marked up website will be better understood by them and they can take them into account. A better positioning in search results will be a good sales argument for web developers.

4.2 Challenges

But to have a machine-readable site could also have disadvantages. Latterly more and more arguable providers aggregate several site feeds and decorate them with their advertisements to make money the easy way. But these rotten apples should not spoil the pie. Although it is very difficult to separate these sites from decent users, they brake copy rights and there should be different ways to prevent these misuses.

4.3 Summary

With the help of modern techniques like XHTML and CSS designers are able to provide accessible web content, without insurmountable obstacles. Today there are a lot of positive examples showing that it is possible to create website for everybody. The only challenge left is to inform and convince the right people to take the right steps. Then an accessible web is already at the gates, but we all have to open the doors.

Users should be aware of the needs of others and chose their partners in regard of these to put pressure on the publisher. And web designers and enterprises should mind all users, not only the majority.

Glossary

BITV Barrierefreie Informationstechnik Verordnung - the Web Accessibility enactment by Germany's Federal Government [1]

CSS Cascading Style Sheets - technique to describes the way how an XHTML File should be rendered in a browser

RSS Rich Site Summary, Really Simple Syndication - an XML-Dialect to provide news, articles and alike information

User Agent An application used to browse the web. Graphical user agents are also called browsers. Furthermore there are text browsers, screen readers, braille readers and other assisting technologies. Today's most popular user agent is the Microsoft Internet Explorer with a market share of about 90 per cent.

W3C World Wide Web Consortium - "The World Wide Web Consortium (W3C) develops inter operable technologies (specifications, guidelines, software, and tools) to lead the Web to its full potential"

WAI Web Accessibility Initiative - an initiative of the W3C to standardize Web Accessibility guidelines

WCAG Web Content Accessibility Guidelines [4] - a set of checkpoints to assess the accessibility of websites published by the W3C

XML eXtensible Markup Language - a technique which allows the easy platform independent exchange of information

XHTML eXtensible HyperText Markup Language - an XML-Dialect to markup websites and digital content

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