

Web Accessibility

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WEB ACCESSIBILITY

The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect. (Tim Berners-Lee, W3C Director and inventor of the World Wide Web)

INTRODUCTION

Accessibility means making resources usable by the largest number of people possible, or alternatively, allowing people with some kind of disability to effectively participate in day-to-day activities, including the use of services, goods, and information. The evolution of civil rights enhanced the physical world with several accessibility aids, such as ramps to remove architectural barriers for wheelchair users or bells near elevators for blind users. To address the size of the “disable world”, let us consider that only in the European Union there are about 37 million people with disabilities. Disabled people find in the Internet a major reference for their daily necessities to overcome their difficulties in moving and communicating. As institutional, economical, and social services provided through the Web become increasingly central to our lives, to avoid the risk for severe social exclusion, there is the need for “accessibility aids” for the Web. Informally, it means that Web-based content should be presented in a way that allows disabled users to maximally and equally benefit from the information, as well as have the faculty to fully interact with the site. People with physical, cognitive or even technological disabilities should be enabled to effectively read information, browse sites, compile forms, navigate links, download documents, and so on. This goal can be achieved by using a mix of hardware/software solutions, suited to provide specialized input and output capabilities. For example, text-to-speech systems read

text on the screen, allowing blind users to navigate Web sites. However, to work effectively, such solutions require Web designers to use Internet technologies accordingly to some recommendations. Incidentally, the recommendations and principles that form the accessibility foundation are very similar to the factors affecting Web quality (Fitzpatrick, 2000; Top of the Web, 2003), and thus can provide benefits to every user of the Internet, whether disabled or not. As a result, accessibility should represent one of the most important references for Web developers.

In this article, we provide an insight into the development of accessible Web sites. In particular, we will start by outlining the historical background about the accessibility issues. Then, we will focus on the design of Accessible Web sites inspired to the *universal design* principles (Follette, Mueller, & Mace, 1998) and *World Wide Web Consortium’s* (W3C) directives, and on the solutions to verify and validate accessibility. Finally, we will give an insight on future trends and challenges due to novel Internet technologies.

BACKGROUND

In order to avoid a growing digital divide in access for people with disabilities, many efforts have been devoted on developing accessibility solutions for the Web. As a result, most of the digital barriers for disabled people can now be easily avoided if site designers follow a set of simple rules, which were mainly defined by the *World Wide Web Consortium’s* (W3C) *Web Accessibility Initiative* (WAI) (W3C WAI, 2005). Funded by government, industries and W3C members, the WAI is responsible to create technical guidelines regarding accessible content, browsers and authoring tools. The *Web Content Accessibility Guidelines* version 1.0 (WCAG 1.0, 1999), recognised as a *de facto* standard for the design of accessible Web

sites, has three conformance levels (*A*, *Double-A*, and *Triple-A*), depending on the accessibility rank. To ensure an effective level of accessibility, Double-A is recommended.

In many countries, the evolution of disability rights laws have resulted in the understanding that access to information and communication is a civil right for people with disabilities (Waddell, 1999). Then, many governments around the globe, such as European Union, United States, Canada, and Australia, issued laws and regulations demanding accessibility for public organization sites, usually starting from W3C WAI technical recommendations.

European Union resulted very sensitive on this issue, since Web accessibility results to be a strategic objective of the European Commission's Information Society. In particular EU is promoting the concept of *e-inclusion*, aimed to prevent "risks of digital exclusion", that is to ensure that disadvantaged people are not left behind and to avoid new forms of exclusion due to lack of digital literacy or of Internet access (EU 6th FP, 2004).

United States legislation widely covers Web accessibility aspects. The Section 508 of the Rehabilitation Act of 1973, revised in 1998 (Section 508, 1998), imposes strict accessibility requirements for electronic and information systems developed, maintained, procured, or used by federal agencies. Title II of the Americans with Disabilities Act requires institutions to take appropriate steps to ensure that communications with persons with disabilities "are as effective as communications with others" (Section 504). Office for Civil Rights has repeatedly held that the term "communication" in this context means the transfer of information, including the resources of the Internet. This means that U.S. institutions must provide documents in an alternate format in order to remove communication barriers regardless of its original format.

About solutions for making computers more accessible, there are on the market many hardware and/or software products suited to this aim, and collectively named *assistive technologies*, or accessibility aids. Among these there are:

- **Screen Readers:** Making the information presented on the screen available as synthesized speech or through a refreshable Braille display.
- **Screen Magnifiers:** Supporting people with low vision by enlarging a section of information on the screen.
- **Speech Recognition Engines:** Useful to mobility impaired, by allowing people to control the computer via vocal commands.
- **Alternative Input Devices:** Such as larger keyboards or mice, eye-gaze pointing devices, and sip-and-puff systems controlled by breathing.

DEVELOPMENT OF ACCESSIBLE WEB SITES

Integration of the basic accessibility pre-requisite requires careful design and testing phases. In particular, during the design phase, the designers planned the tasks to be performed in order to build accessible Web pages, so that both graphic and textual Web contents could be navigated by disabled and could be understood by all categories of users. During the testing phase, testers should carry out a complete and exhaustive verification which combines semi-automatic, manual, and user testing of accessibility features.

Designing Accessible Web Sites

The greater level of accessibility can be achieved by applying the principle of the *universal design*, which states that every design activity has to consider the different requirements from all potential users (Follette, Mueller, & Mace, 1998). When dealing with Web sites, this principle can be applied by designing applications that are easy to use, (i.e., directly accessible from every category of users), possibly in combination with assistive technologies.

The application of the *universal design* principle does not necessarily introduce restrictions in the development of software systems and does not limit the expressiveness of Web developers. Indeed, it should be seen as a creative challenge for everyone involved in Web development and not as a limitation. Currently, many Web sites effectively combine accessibility issue with visual appealing. An example is the Web site of the international project VISUAL (*Voice for Information Society Universal Access Learning*) (VISUAL, 2004), a portal aimed to create an e-community for visually impaired people, and supported by the Information Society Technologies Programme of the EU. Another interesting example is the Web site created for the Exhibition "Edvard Munch. The graphics at Kupferstichkabinett Berlin" (EMKB, 2003).

For Web sites characterized by a significant amount of interactions with users and data sources/sinks, the accessibility requirement is more suitably gained if the design is based on the separation of the contents from the presentation modality. Nowadays, this separation is facilitated by the diffusion of the *markup* languages and the use of *style sheets*.

In the following we provide some recommendations that should be taken into account to design and develop accessible Web sites. They are based on WCAG 1.0 guidelines (WCAG 1.0, 1999) and focus on the design and development activities concerning the accessibility design goal.

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