EVALUATION OF ROMANIAN ACADEMIC WEBSITES ACCESSIBILITY. A CASE STUDY

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ABSTRACT. The Internet is used daily by many people, including people with different disabilities. In the last years, many countries have national laws and policies which address accessibility of Internet, the Web or other software applications. In this paper we analyze the website accessibility of some Romanian public universities, in order to find if people with disabilities may access their content without difficulties.

1. INTRODUCTION

"The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect." said the Web's inventor Tim Berners-Lee. The disabilities term has different meanings to different people: impairments (a problem in body function or structure), activity limitations (a difficulty encountered by an individual in executing a task or action), and participation restrictions (a problem experienced by an individual in involvement in life situations). As the World Health Organization states, the disability is a result of a complex interaction between human body features and the society where a person lives [9].

The Web has become an important part of most areas of society and everyday life. In many countries, the Web was rapidly adopted and used for government information and services, education and training, commerce, news, workplace interaction, civic participation, health care, recreation, entertainment, and more. There are also situations in which the Web is replacing traditional resources. Consequently, it is fundamental that the Web is accessible in order to provide equal access and equal opportunity to people with disabilities.

For people with disabilities, the Web is a novel opportunity to access different kinds of information. Many access difficulties to print, audio and video media can be much more easily overcome through web technologies. For example, when the primary way to get certain information was to go to a library and read it on paper, there were significant barriers for many people with different kinds of disabilities, such as: getting to the library, physically getting the resource and reading the resource. When the same information is also available on the Web in an accessible format, it is significantly easier for many people to get it. In some cases, the Web allows people with disabilities to do things that were nearly impossible without it [10].

As more and more university information and educational materials migrate to the web, it becomes increasingly important to ensure that those materials are accessible to people with disabilities, too. If the content of the web sites is constructed with web accessibility in mind, then students with disabilities are afforded a new level of freedom previously inexperienced. For example, blind students can use computer software that reads the web content out loud to them, thus eliminating their previous reliance on other people to read the content to them. On the other hand, if the content is not designed with web accessibility in mind, then students with disabilities will be denied the benefits that should be available to them to the same extent that it should be available to all other students.

Accessibility is a general term used to describe the degree to which a product, device, service, or environment is accessible to as many people as possible [1]. *Web accessibility* means that people with disabilities can use the Web. More specifically, Web accessibility means that people with disabilities can perceive, understand, navigate, and interact with the Web, and that they can contribute to the Web. Web accessibility also benefits others, including older people with changing abilities due to aging [3].

As the Web is an increasingly important resource in many aspects of life (eg., education, employment, government, commerce, health care, etc.), it is essential that the Web is accessible in order to provide equal access and equal opportunity to people with disabilities. An accessible Web can also help people with disabilities more actively participate in society.

Accessibility can be viewed as the "ability to access" and possible benefit of some system or entity. Accessibility is often used to focus on people with disabilities and their right of access to entities, often through use of assistive technology. Related to information technology, accessibility is about removing barriers that inhibit the access of certain groups, including people with disabilities, mature users, and non-native language learners. Accessibility is considered an important issue when designing or modifying software or hardware to allow access to the greatest number of people possible. Understanding

accessibility requires an awareness of the special needs of multiple user groups, including people with disabilities and mature users with age-related disabilities. A person with a disability may encounter one or more barriers that can be eliminated or minimized by the software or Web developer, the assistive technology, or the underlying operating system software and hardware platform [7].

The requirements for a product to be accessible refers to some guidelines and recommendations that must be respected and to be able to interact with assistive technologies. As the Web has become an important part of everyday life for many people around the globe, many countries have adopted laws or regulations that state the degree of accessibility required for Web sites.

The paper is structured as follows. Section 2 introduces the accessibility guidelines that each web application should follow in order to allow disable people to use it. In Section 3 we describe the methods that can be used for accessibility evaluation. The analysis of the Romanian academic websites is presented in Section 4. Conclusions and further work are given in Section 5.

2. Web Accessibility Standards (Guidelines)

To this day there are no general accepted rules or guidelines in developing accessible web content. The World Wide Web Consortium (W3C) and the Web Accessibility Initiative (WAI) [29] have put together two sets of guidelines that should help developers improve the accessibility of web sites, and should also help authoring tools in evaluating web sites accessibility.

The first set of guidelines, called *Web Content Accessibility Guidelines 1.0 (WCAG1.0)* was put together in 1999, and it contained a set of guidelines and principles about how to make web content accessible to people with disabilities [30].

The second version of the document, *Web Content Accessibility Guidelines 2.0 (WCAG2.0)* appeared in 2008 [31], and it included an extended version of guidelines and recommendations of the previous document that should make Web content accessible to a broader range of people with disabilities (blindness, low vision, deafness, hearing loss, learning disabilities, etc.). It applies more broadly to different types of Web technologies and to more advanced technologies. It is designed to apply as technologies develop in the future. The WCAG 2.0 requirements are more precisely testable with automated testing and human evaluation. This allows WCAG 2.0 to be more easily used where specific requirements and conformance testing are necessary, such as in design specifications, purchasing, regulation, and contractual agreements [31].

Both versions of guidelines are browser independent and they also contain techniques for checking the guidelines implementation.

The guidelines are organized around four principles that are necessary in order for anyone to access and use Web content [31]:

- *Perceivable.* Information and user interface components must be presentable to users in ways they can perceive.
- *Operable.* User interface components and navigation must be operable.
- *Understandable.* Information and the operation of user interface must be understandable.
- *Robust.* Content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies.

For each principle there are a set of guidelines of how it can be implemented and also a set of success criteria that describe specifically what must be achieved in order to conform to this standard. Both the guidelines and the success criteria are technology independent [31]. For example, for perceivable principle, one guideline says: "Provide text alternatives for any non-text content so that it can be changed into other forms people need, such as large print, braille, speech, symbols or simpler language".

The WCAG2.0 has divided the success criteria into three levels of conformance: A, AA, and AAA, with level A being the minimum level of conformance. Level AA is an extension of level A, and level AAA is an extension of level AA to which more success criteria that are satisfied were added. Even though Level AAA contains the biggest number of success criteria that should be satisfied, there are many situations when it cannot be accomplished. That is why it is not recommended to set level AAA as general policy for web content accessibility.

2.1. **Web Accessibility Laws.** The emergence of Web as a new and fundamental form of Information and Communications Technology (ICT) raises new questions about the application of existing laws and policies to this medium, and the importance of all members of society being able to access it. Among these members are also included people with different kind of disabilities: blindness, deafness, learning disabilities, etc.

In many countries around the globe there is a growing body of national laws and policies which address accessibility of ICT, including the Internet and the Web. Different approaches have been considered for these laws and policies: some take the approach of establishing a human or civil right to ICT; others have taken the approach that any ICT purchased by government must be accessible, and others that any ICT sold in a given market must be accessible. For example, US Section 508 [6] is a piece of US federal legislation, which mandates that websites produced for federal agencies must conform to at least a specific set of defined requirements. Similar accessibility requirements

are applied in country like United Kingdom, Australia, Switzerland, Finland, France, Germany, Spain, etc [8].

Romanian laws and regulations require that public places, the outdoor environment, means of transportation, and housing are made accessible. Accessibility is observed by a national authority and local governments.

The web accessibility is regulated by Law 448/2006, article 71, revisited in 2012 stating that all public web sites must be accessible. Based on this regulation, we are now interested in verifying if the websites of Romanian public universities implement the web accessibility recommendations.

3. WEB ACCESSIBILITY EVALUATION

There are two basic approaches to accessibility evaluation: the use of a software tool or the use of a human evaluator.

Software tools can quickly identify objective problems (described in WCAG2.0) such as images without *alt* text, form elements without *<label>* tags, tables without headers, and so on. Some tools can even identify a few of the more subjective problems, such as suspicious *alt* text, suspicious link text, and text that might be more appropriate as headings. Several software tools can spider through web sites and produce reports for the entire site, including statistical analysis of the most frequent errors, a list of pages on which errors occur, and other useful information. Gathering this type of information without such software would be almost impossible. However, software tools are incapable of determining whether the content is logical, understandable, or intuitive, that is why human involvement in the accessibility evaluation process is needed.

Accessibility evaluation must also take into account what it is like to experience the web with different senses and cognitive abilities. It must also take into consideration the various unusual configuration options and special software that enable web access to people with particular disabilities. That is why, in order to ensure quality and save time and money, accessibility evaluations should start right at the beginning of product design and be included in subsequent development iterations.

Before accessibility evaluation begins, it is recommended to determine what the key requirements are for that project, given its environment, intended audience, and resources.

Some requirements will be set by third parties like governments. These typically take the form of general legislation against discriminating people with disabilities, rather than mandating a particular standard or enumerating precise conformance requirements. An important exception is when legislation enforces a particular standard for public sector.

There are basically two groups who are involved in human based testing: experts and users.

Expert testing is important because experts understand how the underlying web technologies interact, can act as a clearing house for knowledge about different user groups, and have the inclination to learn dedicated testing tools.

User testing is crucial because users are the real experts in their own abilities and their own assistive technology. User testing can also reveal usability gaps between more and less technical users, and between people who are familiar with the web site in question (such as the expert testers themselves) and people who are new users.

3.1. **Web Accessibility Evaluation Tools.** Since the acknowledgement of the need of web accessibility, different software tools have been developed for web accessibility evaluation. The WAI site contains a list of tools that can be used for accessibility evaluation, however this list has not been updated since 2006 [5]. Among the most popular (used) tools there are AChecker [2], Cynthiasays [4], TAW [12], SortSite [11].

The existing tools usually verify the compliance with some or any of the existing guidelines (WCAG1.0, WCAG2.0), the conformance levels A, AA, and AAA, or compliance with US Section 508. In order to improve the obtained results some tools also require the setting of the technology to check against(Javascript, etc).

4. Evaluation

We have chosen as case study websites of the Romanian public universities, as the compliance with Romanian laws is required only for public institutions. It is not our intention to provide a classification of the selected universities based on their accessibility, but to identify the most frequent accessibility problems that might appear when accessing these websites. We also want to make people aware of these problems, as in the last years more and more people with disabilities have been attending the public universities.

4.1. **Chosen universities.** For this evaluation we have chosen the public universities from Romania that were ranked in the first category during the evaluation process from 2011: University of Bucharest [16], Babeş-Boyai University from Cluj-Napoca [20], Alexandru Ioan Cuza University from Iaşi [19], Bucharest University of Economic Studies [15], University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca [25], University of Medicine and Pharmacy "Carol Davila" Bucharest [21], Gr. T. Popa University of Medicine and Pharmacy from Iaşi [23], Iuliu Haţeganu University of Medicine and Pharmacy from Cluj-Napoca [22], University Politehnica of Bucharest

[24], Gheorghe Asachi Technical University of Iaşi [17], Tehnical University of Cluj Napoca [26], and Politehnica University of Timişoara [18].

4.2. **Evaluation Tool.** The accessibility evaluation tool that we have used for this study is the free edition of SortSite 5 from PowerMapper [11]. We have selected this tool because it analyses up to 100 links from the starting page. Most of the evaluation tools available analyze only the starting page of the given URL, so in order to check the accessibility of a more complex site, each page must be manually given as input to these tools.

4.3. **Results.** After analyzing the previously mentioned sites, we can conclude that each site has accessibility problems. In Table 1 we synthesize the problems discovered by the evaluation tool. The problems were encountered in at least half of the analyzed sites.

Problem	No of sites	Total no of sites
Each A tag must contain text or an IMG with an ALT tag.	12	12
This form control has noassociated LABEL element.	12	12
This form control has no associated LABEL element.	11	12
This page has markup errors, causing screen readers to miss content.	10	12
Use the LANG attribute to identify the language of the page.	8	12
No TITLE attributes found for the frames on these pages.	7	12
All ONMOUSEOUT handlers should have an equivalent ONBLUR handler.	6	12
All ONMOUSEOVER handlers should have an equivalent ONFOCUS handler.	6	12

TABLE 1. Accessibility errors.

These problems make it difficult for people with visual disease to navigate the universities sites. Although these problems can be easily overcome, simply by following some guidelines in the design and implementation of the sites, like setting the language for each html page (especially for universities that offer specializations in different languages), or setting the ALT attribute for each *href* and *img* label, we suggest a long term strategy in improving the experience of people with disabilities. The first step would be to create an adequate accessibility policy as other universities (University of Michigan [14], University of Texas [27], University of Wisconsin [28], Cambridge University

[13]) do. The second step would be to implement the requirements stated in the accessibility policy, given the fact that most of the universities having a web accessibility policy fail to implement it successfully [32].

5. Conclusions and Further Work

We have presented in this paper a first evaluation of the accessibility of Romanian public universities websites. We have analyzed the websites of the twelve most important public universities from Romania. The analysis has shown that all sites have accessibility problems, most of them addressing people with visual disease. The problems can be easily solved by following simple guidelines in the development of the web sites. In the future we intend to analyze the accessibility of other public institution websites and to apply user testing to create a complete image of the problems that may arise when accessing the websites content.

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