Web Accessibility – From the Evaluation and Analysis to the Implementation – The anoGov/PEPPOL Case

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Abstract. The XXI Century society has developed a drive for Information and the Web, as one of the extremely important technologies of our times, represents the main channel to access it. As a result of this, one can perceive that the Web, and the inherent websites, must be accessible to all, in order to maintain the imperative social equality. Despite the legal requirements to the Portuguese Web content accessibility levels, in effect since 1999, the existent studies that focused on assessing those same levels of accessibility reported that the Portuguese websites, in their majority, were not compliant with the existent standards. In mid-2007 we started, within our research group and in partnership with both UMIC – Knowledge Society Agency and APDSI – Association for the Promotion and Development of the Information Society, a Web accessibility barometer. The goal of this barometer has been assessing the accessibility levels of the Portuguese websites, creating recommendations - for both the organizations and the civil society - towards the improvement of the referred websites, and publicly presenting the achieved results. One of the Portuguese enterprises that is adopting the accessibility standards into its public procurement platform anoGov is ANO. This company established a research project alongside UTAD University in order to achieve technical know-how and good practices that allowed them to develop accessible and usable Web content.

Keywords: Web accessibility, Barometer, Portugal, ANO, anoGov/PEPPOL.

1 Introduction

In a World where the possibility of accessing Information is considered a very important issue and the Internet is one of the most used ways of access, it is extremely important that the websites present themselves accessible to all [1-3].

Given that 10% of the European citizens present some sort of disability or incapacity, it is important that European websites present themselves accessible to all [10-12].

Accessibility can be defined as the ability of a disabled or incapacitated person to access services or products or execute a given task in an equal manner as one without any impairment. In the ICT domain, one can characterize accessibility as the existence of interfaces that can be used and perceived by all the users, in an equal manner [13-15].

Despite the legal requirements to the Portuguese Web content accessibility levels, in effect since 1999 [4], until the year of 2008 the existent studies that focused on assessing those same levels of accessibility reported that the Portuguese websites, in their majority, were not compliant with the existent standards[5].

In mid-2008 we started, within our research group and in partnership with both UMIC – Knowledge Society Agency and APDSI – Association for the Promotion and Development of the Information Society, a Portuguese Web accessibility barometer. The goal of this barometer has been assessing the accessibility levels of the Portuguese websites, creating towards the improvement of the referred websites, and publicly presenting the achieved results[6] [6, 7, 9]. Currently a new edition of the barometer is being performed in order to perceive the current compliance levels of the websites belonging to the biggest 1000 Portuguese enterprises [8].

Given the significant levels of e-banking and e-education platforms adoption, an also considerable importance must be given to the implementation of accessibility features in these same platforms. With this in mind and in order to perceive the reality of the Portuguese banking websites and the Portuguese schools websites, we decided to evaluate those same websites against WCAG 2.0 guidelines [8, 16].

Considering the current Web accessibility relevance, we assumed that it was decisive to have awareness on the accessibility levels of the international websites. With this in mind, we performed an accessibility evaluation to the top 250 companies included in Forbes global 2000 list [17], against W3C WCAG 2.0. The achieved results indicated that none of the evaluated websites presented any level of compliance with the referred standard [18].

By analyzing the levels of compliance with W3C WCAG (1.0 and 2.0) Web accessibility guidelines presented by the Portuguese websites and the feedback obtained from the publication and presentation of our Web accessibility studies and projects, it is possible to see that an improvement to these levels is happening and that the Portuguese population is indeed more sensitive to the subject and prone to require the existence of accessibility features in the Web content that they use.

This article is divided in five sections, including the introduction and subsequent theoretical and background considerations (Sections 1 and 2). In Section 3 we present the Portuguese Web accessibility Barometer, mainly describing the research group and the work that has already been done. Despite the poor Web accessibility results that were achieved in the evaluations made to the Portuguese websites, our research group has been working alongside ANO (a Portuguese company that developed the anogov.pt public procurement platform) in order to apply the W3C Web Content Accessibility Guidelines – WCAG 2.0 and the usability "good practices" to their development/programming activities (Section 4). Some final considerations on the content of the paper are present in Section 5.

2   Web Accessibility – Concepts and Contextual Background

2.1   Concepts

The use Information and Communication Technologies – ICT has evolved during the last decade. They are now a well-known and used set of technologies that, alongside

Internet, allowed the World the ability to access Information at any given moment and from any computer or mobile device with a Web browser. By using ICT in both work related and social/cultural activities, the end users created the need for high accessibility levels within these same technologies. By satisfying the referred need the benefits of using ICT will be available to all, including those with some sort of disability or impairment [12, 19].

Despite the various definitions for the term accessibility, in the context of the present paper we assume that accessibility is the ability of a person with disabilities to access a given service or product or execute a given activity in an equal manner as a person who does not have any kind of disability. The accessibility is a topic that can be applied to multiple areas, such as the ICT. In the ICT "world" the term accessibility can be simply defined as the existence of interfaces that can be used, acknowledged and perceived in the same manner by all users, whether they are disabled or not [13].

In the same way as accessibility applies to ICT, when passing to the World Wide Web (or simply Web) we also need to have that concept in mind. When combining the accessibility issue with the Web platforms and interfaces we are presented with a new term, the "Web accessibility". According to several authors [13, 14], Web accessibility can be characterized as the existence of Web interfaces that, just as with non-Web ones, must be perceivable and usable in the same easy way by both users without disabilities as well as users with some kind of disability.

According to [20, 21] there are several factors that influence the levels of accessibility of a given Web content. Among those factors are the Web content developers' technical and personal skills, the ability of the existing authoring tools to provide a mechanism for creating accessible Web content and also to the capabilities of the accessibility evaluating tools that evaluate Web content against the existent Web accessibility regulations.

In sum, it is possible to say that accessibility needs to be looked at with its deserved care and attention [13, 22].

2.2   Contextual Background

From over a decade ago several have been the organizations that, at a given time in their history, have focused their attention and work on the Web accessibility subject [23]. As a result of these efforts, several international and national regulations on the referred subject have been published.

The W3C Consortium has published two international regulations aiming to create a set of rules and a set of pointers that should not only help regulating the Web but also help content creators to introduce Web accessibility as a feature of their development projects. The two regulations created the Web Content Accessibility Guidelines (WCAG) 1.0 (1999) and the Web Content Accessibility Guidelines (WCAG) 2.0 (2008) that represents the current international regulation on Web content accessibility defended by the W3C [24, 25]. In WCAG 2.0, four principles have been used as the basis for the entire set of guidelines [24]:

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

Another organization that published international Web accessibility regulations is the International Standardization Organism. Regulations such as the ISO TS 10071, ISO 9241-110 or ISO 9241-171 are examples of accessibility (and also usability) international regulations published by the referred organization [26-28].

Despite all the regulations published by several of the international regulation organizations, a different regulation regarding Web content accessibility was created and named "Section 508". According to the USA Congress this regulation intended to ban all the barriers when accessing ICT, thus making these technologies available to all citizens, including those with any kind of disability or incapacity [29].

The clear and visible awareness on the Web content accessibility issue is creating the required space for the users that up to this time persistently encountered barriers to the use of the Web, to become frequent "online navigators" and being able to seize the benefits of this technology. This requirement has been translated into legal obligation in several countries, including Portugal.

The last demographic study made in Portugal revealed that almost 10% of the Portuguese citizens present some sort of disability or incapacity [30]. Despite the early incorporation of Web accessibility standards in the Portuguese websites, they are still present several critical accessibility faults. This problem can be perceived through the analysis of the already published studies [9, 16, 31-33].

3   The Barometer

3.1   Macro Background

In mid-2007 in the context of a multidisciplinary support to the APDSI (Portuguese Association for the Promotion and Dissemination of the Information Society) activities that focused electronic business and the quality of the Portuguese websites, a group of academic researches and members of private and public companies, was formed. The founding members of the research group previously mentioned had a very widespread curriculum. They included both academics and practitioners with different profiles (from Information Systems directors to lawyers and senior consultants).

By presenting diverse backgrounds and different perspectives on several themes, including Web accessibility, the research group was able to achieve results that allowed for an initial characterization of the Portuguese reality in what concerns the quality of the websites and their ability to be accessed by all. With this in mind, the idea of creating a Portuguese Web accessibility barometer emerged.

A mass accessibility evaluation to the Portuguese websites is the best definition for the barometer mentioned above. This evaluation is made using the W3C WCAG as the reference regulation and using automatic website evaluation tools (such as TAW3[35] and SortSite[36]).

3.2   Achieved Work – WCAG1.0 Barometer and WCAG2.0 Barometer

As a result of all the activities of the research group inherent to the present paper, several reports and publications have been made. These publications have been serving as a support for several projects and initiatives from the Portuguese academic universe, the Portuguese companies and the Portuguese governmental entities.

WCAG 1.0 Barometer – 2007/2008 – 2009/2010.
Between 2007 and 2010 we performed several studies regarding the Portuguese Web accessibility. This was also the period in which we, as a research group, started performing the Portuguese Web accessibility Barometer using W3Cs WCAG1.0 guidelines as the reference international Web accessibility regulation.

The following studies represent the initial stages of the referred barometer and has it is possible to perceive by analyzing table 1, the Portuguese websites that were evaluated presented, in their majority, severe accessibility issues:

- Evaluation to the websites of the 1000 Biggest Portuguese enterprises in business volume [6, 7]:

- In this study we have evaluated the websites of the biggest Portuguese enterprises against W3Cs WCAG1.0 using for this the TAW3 tool;
- For this initial study we decided to analyze a sample of 30 pages from each website;
- The achieved results were, in their majority, very bad. The average number of errors for each of the WCAG1.0 priorities (1, 2 and 2) is considerably high and within the 1000 evaluated enterprises, only 73 had the WCAG1.0 conformance level A and only 1 enterprise had the WCAG1.0 conformance level AA. None of the evaluated enterprises had a fully accessible website (WCAG1.0 conformance level AAA);
- With these results it was possible to claim that the majority of the evaluated websites presented severe accessibility problems.

Table 1. Error statistics that support the Portuguese Web Accessibility Barometer for the period between 2007 and 2010 and using W3C WCAG1.0

	2007/2008			*2009/2010*		
	P1	**P2**	**P3**	**P1**	**P2**	**P3**
Average	180	1375	212	1361	64	125
Standard Deviation	215	1352	200	2706	147	235

WCAG 2.0 Barometer – 2009/2010 – 2012/2013.

Given the publication of the second version of W3Cs WCAG guidelines, a decision was made to perform an evolution to the created barometer in order to contemplate this new version. This evolution required the following steps to be made [7, 8]:

- Perform a full extensive analysis to the 2.0 version of WCAG;
- Perceive the differences between the 1.0 and the 2.0 version of the guidelines;
- Find a new automatic evaluation tool compliant with W3C WCAG 2.0 and with an error report considerably easy to analyze;

After fully analyze WCAG2.0 and start an active collaboration with PowerMapper in order to be able to use SortSite, we were able to start our activities focusing the WCAG2.0 barometer.

Table 2. Error statistics that support the Portuguese Web Accessibility Barometer for the year of 2010 using W3C WCAG2.0

	2009/2010		
	A	**AA**	**AAA**
Average	1361	64	125
Standard Deviation	2706	147	235

Between 2009 and 2010 we performed an evaluation study to the websites of the previously referred 1000 enterprises (table 2), using as reference the WCAG2.0 guidelines. The results of this study were the following [8]:

- In this study we have evaluated the websites of the 1000 biggest Portuguese enterprises in business volume against WCAG2.0 using for this the SortSite tool;
- For this initial study we decided to analyze the entire website;
- The achieved results were considerably negative. By analyzing the average number of errors for each conformance level, it is possible to perceive that the achieved values represent the existence of serious Web accessibility issues;
- From the 1000 enterprises that were evaluated, only 2 of them were WCAG2.0 Level A compliant and only 1 enterprise was WCAG2.0 Level AAA compliant.

4   Case Study – anoGov Public Procurement Platform

Despite the results achieved in the context of the previously mentioned web accessibility barometer, there are several Portuguese enterprises that have took into consideration our research group efforts and the published Web accessibility barometer and are performing serious and planned changes to their internal activities, in order for their websites and web platforms to become accessible to all, including those with some sort of disability.

An example of an enterprise that is performing the mentioned changes is ANO. ANO is a Portuguese company with headquarters in Oporto city, Portugal, a branch in São Paulo city, Brazil (and that is aiming on spreading its business to other locations in Europe, Africa and South America) whose main product is a public procurement platform entitled anoGov (http://www.anogov.pt).

Given the lack of technical know-how and expertise on Web accessibility and usability, ANO has approach our research group and the University of Trás-os-Montes e Alto Douro - UTAD in order to establish a partnership (in the form of a research project) in which the UTAD part was not only knowledge transfer but also the creation of reports and Web development guidelines, and at the same time give technical support to the anoGov platform development.

Currently the research project inherent to the anoGov platform is an initial stage where the following activities are being performed:

- Analysis on the international regulations and standards on Web accessibility and usability;
- Analysis on the existent scientific knowledge on implementation techniques that allow the creation of accessible Web content;
- Evaluation of anoGov platform against W3C WCAG1.0, W3C WCAG2.0 and US Section 508;
- Creation of a report that focus its attention on the errors detected during the evaluation activities and that aims on not only reporting the detected errors but also on presenting solutions and techniques to solve those errors;
- Creation of a "good practices manual" that will consist on guidelines that the ANO development and planning teams will incorporate in their day-to-day routines, thus resulting in not only planning and creating accessible and usable Web features for the anoGov platform but also to allow for an optimization of their knowledge and their efficiency.

By assuming that changes are needed in order not only to fulfill legal obligations but also to provide full access to the anoGov platform, ANO is assuming itself as a case of an enterprise that aims on following good planning and development practices and that subsequently develop and supply an accessible and usable public procurement platform.

5   Final Considerations

The current rate at which Information (in the form of Web content) is being accessed and made available through the Web clearly indicates that there is a need for this content to be accessible to all, including those with some sort of disability.

Several are the international organizations that focus their attention and work on the Web accessibility topic. This resulted in a series of regulations and standards that aim on helping Web content developers to be able to incorporate accessibility features in their creations.

With the creation of a barometer for the Portuguese Web accessibility we, as a research group, believe that a commitment is being made in order to provide awareness on the Web accessibility issue and at the same time give feedback to the enterprises of their websites accessibility levels and the types of errors that are affecting the most their website quality.

Despite the bad results achieved by the Portuguese Web accessibility barometer there are still some enterprises that are making considerable efforts in order to transform their websites and Web platforms into accessible and usable "places" for everyone. An example of this is ANO, a Portuguese enterprise whose main product is the anoGov public procurement platform. In a combined effort, ANO and UTAD University have an undergoing research project that aims on not only perform some knowledge transfer but also to provide ANO the tools, knowledge and techniques necessary to adapt their anoGov platform in order to be compliant with the international Web accessibility and usability regulations and standards.

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