

TOWARDS THE IMPROVEMENT OF W3C WEB CONTENT ACCESSIBILITY GUIDELINES

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ABSTRACT

This paper presents the results of a study about possible improvements to the ISO 40500 standard, which contains the web content accessibility guidelines established by the World Wide Web Consortium in WCAG 2.0. Expert web developers from twelve different countries have participated in the study. In order to ensure the objectivity of the results, the experts interviewed were unrelated to each other's. Interesting coincidences in opinions have been found, especially those relating to changing the levels of conformance of some success criteria established by WCAG 2.0. Suggestions about possible improvements were collected, such as modifying the existing criteria or including new ones. The study shows that, in the opinion of the experts, there are still some aspects of the standard that could be improved.

KEYWORDS

Accessibility, Usability, Universal access, User-centered design, WCAG.

INTRODUCTION

Accessibility is the property that products or services have to meet in order to they can be used by any person, including people with disabilities and elderly people. Broadly, Universal Accessibility aims at including all people with disabilities in the target population for user-centered design (Abascal et al., 2013; Amado-Salvatierra et al., 2014). For this, Web developers usually use the Web Content Accessibility Guidelines (WCAG) provided by the World Wide Web Consortium (W3C) (Garrido et al., 2014). The first version (1.0) of these guidelines was

published in 1999, and they were updated in 2008 to WCAG 2.0 (W3C, 2008). In 2012 this version was taken as an ISO standard (ISO, 2012).

WCAG is important, not only for being converted into standard ISO, but also because many countries have created laws based on this standard. For instance, Spain created in 2007 a law that forces publicly funded websites and websites of relevance to citizens (such as Banks, energy companies, etc.) to meet the standard. At present the European Union is discussing about a law similar to the Spanish one, which will be applied in the future to all websites of the member countries (EU, 2014).

WCAG defines 61 success criteria that can be applied to web pages and websites. The success criteria are grouped into 12 guidelines and 4 principles (Table 1). In addition, three levels of conformance are established (A, AA and AAA) for websites, depending on the success criteria met. To get level A, 25 criteria have to be met. To get level AA, besides the aforementioned, 13 more criteria have to be met. Level AAA is got when all 61 criteria are met.

This paper shows the results of a study about possible improvements of WCAG 2.0 based on the opinions of expert web developers who use the standard. The method used is described in the following section. Section 3 analyzes the success criteria of WCAG 2.0 whose level of conformity should be changed, according to the experts' recommendation. Section 4 presents other experts' recommendations. Finally, the last section highlights some conclusions of the study.

Table 1. Organization of 61 success criteria in WCAG 2.0.

Principles	Guidelines	Number of Success Criteria
1. Perceivable	1.1 Provide text alternatives	1
	1.2 Provide alternatives for time-based media	9
	1.3 Create adaptable content	3
	1.4 Make content distinguishable	9
2. Operable	2.1 Make all functionality available from a keyboard	3
	2.2 Provide users enough time to read and use content	5
	2.3 Do not design content in a way that cause seizures	2
	2.4 Provide ways to help users navigate	10
3. Understandable	3.1 Make text content readable and understandable	6
	3.2 Make Web pages appear and operate in predictable ways	5
	3.3 Help users avoid and correct mistakes (input Assistance)	6
4. Robust	4.1 Maximize compatibility with user agents	2

METHOD

The study consisted of collecting the experts' suggestions about possible improvements of the WCAG 2.0 standard. In order to shorten reviews, a set of 10 open questions was defined, which would allow collecting their opinions in a structured way (Table 2).

Table 2. Questions used in the survey and answers collected from 25 experts.

Question	Answers
Q1. Changing the level of conformity assigned to one or more success criteria ?	22
Q2. Removing one or more of all 61 success criteria ?	5
Q3. Modifying the description of one or more of all 61 success criteria ?	7
Q4. Adding one or more new success criteria ?	8
Q5. Renaming one or more of all 4 principles ?	6
Q6. Renaming one or more of all 12 guidelines ?	2
Q7. Modifying the structure of 4 principles ?	2
Q8. Modifying the structure of 12 guidelines ?	2
Q9. Modifying the structures of 3 compliance levels (A, AA, AAA) ?	6
Q10. Other changes for WCAG 2.0 ?	10

Expert web developers were contacted, who knew and used WCAG 2.0. The following requirements were established in order to ensure the Independence of opinions: not being affiliated with W3C, not knowing each other, being from different countries, and not knowing the answers of the others interviewed. A call was made through social networks, contact lists and forums on web accessibility. The opinion of 25 experts was collected from December 2014 to March 2015, with the countries distribution shown in Table 3.

Table 3. Origin of the 25 experts interviewed.

Country	Experts
Argentina	4
Canada	1
Chile	1
Colombia	2
Ecuador	6
Guatemala	2
Poland	1
Spain	3
United Kingdom	1
United States	2
Uruguay	1
Venezuela	1

PROPOSAL TO CHANGE THE LEVEL FOR THE SUCCESS CRITERIA

As seen in Table 2, almost all experts answered to the first question. It was an open question, so experts could propose to change the level of any of the 61 existing criteria. Moreover, they could also propose to change the actual level to a higher or to a lower one. Some experts proposed to change the level of more than one criterion.

Table 4 shows the suggestions indicated by more than one expert. The experts were not related to each other or knew the others' answers. Therefore the data shown in the table are relevant because the coincidence in opinions is significant due to the great number of possible combinations of criteria and levels.

There were other suggestions for changing levels but only by one expert in each case and therefore they have not been considered in the results of the study. Those suggestions were about the following criteria: 2.2.5, 2.4.5, 2.4.9, 3.1.2, 3.2.3, 3.2.5 and 3.3.3. In all cases the experts proposed to change the current level of conformance to a lower one. However there was a singular case related to criterion 2.2.2 (about moving, blinking, scrolling, or auto-updating information), because the expert was a blind developer and proposed to change it to a higher level (i.e., from level A to AA). This was the only suggestion about raising the level of a criterion to a higher level. The expert argued that this criterion requires great technical effort and, in his opinion as a blind user, not meeting it should not impede that a website reaches the minimum level A of conformance.

Table 4. Main suggestions of changing levels in success criteria.

Success Criteria	From level	To level
1.4.3 Contrast (Minimum): The visual presentation of text and images of text has a contrast ratio of at least 4.5:1	AA	A
1.4.4 Resize text: Text can be resized without assistive technology up to 200 percent without loss of content or functionality	AA	A
2.4.6 Headings and Labels: Headings and labels describe topic or purpose	AA	A
2.4.7 Focus Visible: Any keyboard operable user interface has a mode of operation where the keyboard focus indicator is visible	AA	A
1.4.8 Visual Presentation: For the visual presentation of blocks of text, a mechanism is available	AAA	AA
2.2.3 No Timing: Timing is not an essential part of the event or activity presented by the content	AAA	AA
2.4.8 Location: Information about the user's location within a set of Web pages is available	AAA	AA
2.4.10 Section Headings: Section headings are used to organize the content	AAA	AA
3.3.5 Help: Context-sensitive help is available	AAA	AA

As seen in Table 4, four success criteria are proposed to change their level from AA to A, and five success criteria from level AAA to AA. This is important because most legislations on accessibility (as in the case of Spain) require the websites meet level AA. Precisely one of the experts' reasons is because they consider that those criteria (currently in level AAA) should be legally required; and there is evidence that web developers only take into account levels A and AA, usually ignoring level AAA, because the legislation of their country only require level AA.

By taking into account the experts' opinions in Table 4, 43 success criteria should be met in order to reach level AA, i.e., 5 more criteria than currently required. One of them (1.4.8) about guideline 1.4, which recommends making content distinguishable. Another one (2.2.3) on guideline 2.2 to improve when providing users enough time to read and use content. Two criteria (2.4.8, 2.4.10) on guideline 2.4, which says to provide ways to help users navigate. And a final criterion (3.3.5) related to helping users avoid and correct mistakes.

Table 5 shows the most outstanding reasons to change the level in success criteria. As it can be seen, in some cases there are reasons related to the current

technical ease for developers to implement some of the criteria. Therefore decreasing their level makes sense currently because it will bring great benefit to users without taking great effort to developers.

Table 5. Main reasons to change the level in success criteria.

Succes s Criteria	Reasons to change to the proposed level
1.4.3	Contrast is essential when accessing the information on a webpage, regardless the user has a disability or not. Users may experience eyestrain and some features can remain hidden.
1.4.4	It is very important and easy to meet by developers. When the text size is increased through assistive technology, the content on the website may be distorted, so trying to understand the whole website may be tedious.
1.4.8	Partially sighted use own color schemas, for example yellow text on black background. Many sites cannot be modified by own CSS styles, because it is blocked. It is easy to meet and can significantly improve usability.
2.2.3	The user should be able to decide the time he/she wants to view the content. Websites should have a functionality to evaluate whether the user is disabled when accessing the site.
2.4.6	It is very important and easy to meet by developers. Essential to help users understand what information do webpages have and how it is organized. It promotes consistent navigation.
2.4.7	It must be a minimum requirement (A) because focus helps people with visual disabilities determine the size of an object within the scheme, especially in complex designs with too many elements.
2.4.8	It is very important and easy to meet by developers. For a blind user, location is essential because he/she can easily get lost when navigating among a group of pages.
2.4.10	It is not technically difficult to meet and is very helpful to the user of a screen reader.
3.3.5	It benefits users with reading and writing difficulties, as well as with intellectual impairments. It is essential the first time a site is visited. Difficult to understand or misinterpreted questions may be present.

OTHER SUGGESTIONS FOR IMPROVEMENT

The previous section explained the main suggestions obtained from the interviews to experts, which generally were related to changing the levels of success criteria. However, other nine open questions were asked in the interviews. No opinions were shared by more than one expert in questions related to removing success criteria (Q2), modifying the principles (Q7) or guidelines (Q8), or renaming the guidelines (Q6). Nevertheless, in the latter case (Q6) is interesting to note that one of the experts suggested to rename guideline 2.3, changing the “seizures” term for “damage” because it is clearer.

Some answers to the other questions were the same for more than one expert (Table 6). Regarding the modification of the success criteria (Q3), opinions shared by various experts were collected, about rewriting the description of the three criteria related to the “Operable” principle to improve the interpretation of those criteria by developers.

Some experts suggested adding success criteria (Q4), but Table 6 only shows two cases in which various proposed such a thing. We underline that, although the experts were not related to each other and were from different countries, a common opinion about adding two new success criteria was found. One success criterion is to adapt WCAG to recent recommendations about responsive web design (Marcotte, 2010). The second one is to adapt to the new interfaces of devices with no keyboard, in which interaction is based on gestures or touches on the screen.

Regarding the names of the WCAG 2.0 main principles (Q5), some experts suggested that the name of principle 4 “Robust” should be changed because it does not show precisely the aim of the principle. Furthermore, considering that this principle only has one guideline and it is about compatibility, maybe the name would be more precise if referred to “compatibility”.

Table 6. Opinions shared by more than one expert.

Question	Most relevant suggestions for improvement
Q3. Modify criteria	<p>(2.3.1) “Three Flashes Or Below Threshold” is guilty of describing the quantification rather than the issue. Overall, someone should go through the names and make sure they are all harmonized to describe how things should be, rather than how they should not be.</p> <p>(2.4.4) Success for accessibility means that at minimum the purpose of a link can be determined by link text alone. This language allows for the continued use of “here” and</p>

Question	Most relevant suggestions for improvement
	<p>“click here” if the content of the surrounding text tells you want “here” is.</p> <p>(2.4.5) To the text “More than one way is available to locate a Web page within a set of Web pages”, add the following: “and this way should be located in a fixed location”.</p>
Q4. New criteria	<p>(1.3.4) Responsive design. The design of a webpage should be adaptable to any device or screen size without losing navigability and understanding.</p> <p>(2.1.4) Touch or gesture accessible. All elements should be navigated and activated using touch screen or gesture with built-in assistive technology (Level A).</p>
Q5. Rename principles	(4) Rename “Robust” for “Compatible”. This principle is only decomposed into one guideline (4.1) about compatibility.
Q9. Change levels	(A) Remove the A level. Integrate into AA. Level AA is the minimum required by laws of the countries.
Q10. Other	<ul style="list-style-type: none"> - WCAG 2.0 should be written in a simpler language. In many places it is incomprehensible even for specialists. - WCAG 2.0 is focused on blindness. Readability is relegated to AAA. Much greater emphasis needs to be put on learning disability / cognitive impairment in general. - Find a synergy between the usability heuristics and the WCAG 2.0 success criteria, in order to achieve a union of concepts that facilitates to evaluate accessibility + usability.

Experts were also asked about the current levels of conformance (Q9). Some experts suggested removing the A level and integrating it into the current AA level, because the AA level is the minimum required to a website is considered accessible. This is in line with the general opinion that developers use level AA because it is the legally required in some countries.

Finally, during the interview the experts could suggest additional improvements (Q10). Table 3 shows three suggestions shared by various experts, such as improving the wording of the standard, including elements to cover more disabilities or integrating more usability recommendations.

CONCLUSION AND DISCUSSION

It is important to highlight that collecting the opinions of experts for the study presented in this paper was difficult. This was due to two reasons: the restrictions to ensure objectivity of responses and the opinion of the experts about the standard is that it is already well analyzed and established. Since WCAG 2.0 is a well-established standard, some experts did not participate because they had never thought that this standard created by W3C could be improved, because they were satisfied with it and, in some cases, they thought that this study should be carried out by W3C.

Interesting matches in opinions have been found during the study, especially those related to changing the level of conformance of some success criteria established by WCAG 2.0. However, suggestions for improvement have been collected, such as modifying existing criteria or adding new ones. This shows that, in the opinion of experts, there are some aspects of the standard that could be improved. We think in these regards that the reason for the improvement of the standard is the advance of the technology. In effect, On the one hand the success criteria that were difficult to implement six years ago, as can be those whose accessibility level is AA, are now easier to achieve. On the other hand, new technology and vocabulary have appeared and they are ready to be added to the standard.

Precisely an emerging activity is present from the end of 2014 (when WCAG 2.0 was published six years ago, on 11th December 2008), especially in web accessibility forums, about a study for improving WCAG 2.0. Furthermore it is being stimulated by the forthcoming revision of web accessibility legislation in the United States, which is being conducted by Section 508 Refresh Project (USAB, 2015).

No other works about how to improve WCAG 2.0 have been published. W3C is also carrying out a survey to collect suggestions about it, but only to improve WCAG 2.0 auxiliary documents, not the standard itself. Although the results have not been officially published yet, progress reports can be found in the forum supported by the Web Content Accessibility Guidelines Working Group, in the context of the discussion on the Long-term vision of the Web Accessibility Initiative for 2020 (W3C, 2014), and also opinions related in the recent CSUN 2015 conference (Tyllick, 2015).

The study presented in this paper is independent of the one being performed by W3C. Our study is about the standard, not about supporting documents, so the results of both studies could be complementary. The objective of the paper is to move forward to achieve the accessible Web, as well as thinking about how to

improve the recommendations offered to web developers to do so. In this sense, WCAG 2.0 is the worldwide reference standard to undertake the challenge of getting the Web without barriers.

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