

# Applying WCAG 2.0 Guidelines in Online Banking Services-An Empirical Case Study in Argentina

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## Abstract

The W3C Consortium defines guidelines to allow e-citizen access to products and services of Information and Communication Technology. The paper presents, as a case study in Argentina, the web accessibility evaluation applied to a banking web site, using guidelines WCAG 2.0 and an automatic validator.

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## 1. Introduction

The Software Industry and the Computer Service field have gained great connotation in recent times due to the growth of ICT applied to several aspects within market and society.

Software Engineering deals with decoding and presenting information while designing a website so as to ensure that every person can perceive, understand, navigate, and interact effectively on the Internet as well as create and contribute content to the site, beyond any disability he or she may have.

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Web Accessibility means that disable people can have access and use the Web. It was designed to benefit all e-citizens, encompasses all disabilities which affect access to the Web, including visual, auditory, physical, speech, cognitive, and neurological disabilities, as well as changing disabilities which affect elder people due to aging [1].

Web Accessibility is a quality criterion in Software Engineering (SE), where there is a variety of methods and tools prepared to be used in the design and developmental processes. Therefore, international standards to design develop and evaluate the quality of a Web software product should be taken into account. Some of them could be mentioned are Web Content Accessibility Guidelines (WCAG) 2.0 and ISO/IEC 40500:2012 ([2], [3]). This means that software construction cannot be exempt from the application of the quality criteria, being accessibility one of them.

As [4] explains, measuring the quality of designed and used Web sites is currently of vital importance to banking organizations, which seek to position themselves on the Internet. Besides that, it allows the financial area to benefit by providing accessible information to all kind of services offered, which facilitates the intervention with no spatiotemporal restrictions of those who may have disabilities.

In this context, it is essential for bank sites to avoid problems as regards accessibility to contents, which is possible if guidelines and standards proposed by the W3C [5] are followed. There is a great variety of works that address the subject and measure the accessibility in this field such as those exposed in [6] [7] [8]. The current work is part of a research which focuses on the investigation of methods and tools to evaluate quality systems, being the main issue the accessibility. In other words, the application of standards in the design and development of web sites is a way to address innovative technological projects for its scalability, specially to operate with on line banks.

## 2. Method

The applied method followed the stages below:

- **Stage 1.** Projects developed by other areas of the country and the studies mentioned by [3] were surveyed.
- **Stage 2.** The theoretical framework referred to the subject was studied in deep, using documents and tools provided by the W3C as data sources.
- **Stage 3.** The Banking Web site were selected.
- **Stage 4.** Criteria established by the WCAG 2.0 guidelines [9] were defined.
- **Stage 5.** TAW [10] was selected since it is an automatic validator available on the web. The validating tool was applied to the web site selected.
- **Stage 6.** Systematization and analysis of data. The results provided by the automatic validator were systematized, in order to analyze the current art state of the application of accessibility, and propose and elaborate further studies from the obtained results.

## 3. Results

This section sintetizes the results obtained considering the WCAG 2.0 guidelines:

**A. Perceivable - Information and user interface components must be presentable to users in ways they can perceive:**

- Text Alternatives: 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;
- Time-based Media: Provide alternatives for time-based media;
- Adaptable: Create content that can be presented in different ways (for example simpler layout) without losing information or structure;
- Distinguishable: Make it easier for users to see and hear content including separating foreground from background.

**B. OPERABLE: User interface components and navigation must be operable:**

- Keyboard Accessible: Make all functionality available from a keyboard;
- Enough Time: Provide users enough time to read and use content;
- Seizures: Do not design content in a way that is known to cause seizures;
- Navigable: Provide ways to help users navigate, find content, and determine where they are.

**C. Understandable - Information and the operation of user interface must be understandable:**

- Readable: Make text content readable and understandable;
- Predictable: Make Web pages appear and operate in predictable ways;
- Input Assistance: Help users avoid and correct mistakes.

**D. Robust - Content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies:**

- Compatible: Maximize compatibility with current and future user agents, including assistive technologies.

Table 1 shows the results obtained through the implementation of the WCAG 2.0 guidelines applied to home page. To describe them at each checkpoint, the following references are used in the columns: YES (Verifies the fulfilment of the criterion evaluated), NO (The criterion was not fulfilled), N / A (Not applicable to the tool selected), RRM (Requires manual revision).

Table 2 summarizes the percentages obtained by the use of TAW validator and the correspondent evaluation based on the recommended criteria. In order to calculate percentages, every criterion proposed by WCAG 2.0 for each principle was taken into account.

Table 3 shows the percentages of correct application, obtained by the use of the TAW validator and the manual revisions required, considering as the only criteria those applied in the banking site. It is important to remark that the Operable principle was mostly applied in the correct form.

Finally, Table 4 expresses in percentage the application of WCAG 2.0 criteria applied in the banking site. The results show the correct application of Perceptible principle (75%), Operable principle (89%), and Understandable principle (86%), while the Robust principle (0%) has not been applied at all.

**Table 1.** Evaluation of the selected site applying WCAG 2.0 guidelines

Guidelines		YES	NO	N/A	RRM
Guideline 1.1 Text Alternatives: 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.	1.1.1 Non-text Content		X		
Guideline 1.2 Time-based Media.	1.2.1 Audio-only and Video-only (Prerecorded)			X	
	1.2.2 Captions (Prerecorded)			X	
	1.2.3 Audio Description or Media Alternative (Prerecorded)			x	
Guideline 1.3 Adaptable: Create content that can be presented in different ways (for example simpler layout) without losing information or Structure.	1.3.1 Info and Relationships			X	
	1.3.2 Meaningful Sequence				X
	1.3.3 Sensory Characteristics			X	
Guideline 1.4 Distinguishable: Make it easier for users to see and hear content including separating foreground from background.	1.4.1 Use of Color	X			
	1.4.2 Audio Control				X
	1.4.3 Contrast (Minimum)	X			
Guideline 2.1 Keyboard Accessible: Make all functionality available from a keyboard.	2.1.1 Keyboard	X			
	2.1.2 No Keyboard Trap	X			
Guideline 2.2 Enough Time: Provide users enough time to read and use content.	2.2.1 Timing Adjustable				X
	2.2.2 Pause, Stop, Hide	X			
Guideline 2.3 Seizures: Do not design content in a way that is known to cause seizures.	2.3.1 Three Flashes or Below Threshold	X			
Guideline 2.4 Navigable: Provide ways to help users navigate, find content, and determine where they are.	2.4.1 Bypass Blocks:				X
	2.4.2 Page Titled		X		
	2.4.3 Focus Order				X
	2.4.4 Link Purpose (In Context)			X	

<b>Guidelines</b>		<b>YES</b>	<b>NO</b>	<b>N/A</b>	<b>RRM</b>
Guideline 3.1 Readable: Make text content readable and understandable.	3.1.1 Language of Page	X			
Guideline 3.2 Predictable: Make Web pages appear and operate in predictable ways.	3.2.1 On Focus				X
	3.2.2 On Input	X			
Guideline 3.3 Input Assistance: Help users avoid and correct mistakes.	3.3.1 Error Identification			X	
	3.3.2 Labels or Instructions		X		
Guideline 4.1 Compatible: Maximize compatibility with current and future user agents, including assistive technologies.	4.1.1 Parsing		X		
	4.1.2 Name, Role, Value		X		

**Table 2.** Percentage of WCAG 2.0 application

<b>Principle</b>	<b>Good Application</b>	<b>Wrong Application</b>	<b>Non Application</b>
Perceptible	21,43%	7,14%	71,43%
Operable	67%	8%	25%
Understandable	60%	10%	30%
Robust	0%	100%	0%

**Table 3.** Percentage of WCAG 2.0 compliance

<b>Principle</b>	<b>Banking web site</b>
Perceptible	21,43%
Operable	67%
Understandable	60%
Robust	0%

**Table 4.** Compliance of WCAG 2.0 regarding the criteria

<b>Principle</b>	<b>Good Application</b>	<b>Wrong Application</b>
Perceptible	75%	25%
Operable	89%	11%
Understandable	86%	14%
Robust	0%	100%

#### **4. Conclusions and Future Work**

The aim of this work was to evaluate a private banking web site operating in Argentina. The systematization and analysis of the data, demonstrate that the overall accessibility guidelines

defined by WCAG 2.0 are not contemplated in the design and development of this online services required by knowledge society citizen.

As mentioned in previous studies, it is evident that the measurement of accessibility web in a wide technology products is a topic of current interest and relevance, considering the validity of these standards and regulations to promote a better quality of technologies for human's use.

In order to assure the accessibility adoption in web site design, the WCAG 2.0 guidelines might be supported and reflected as a non-functional requirement in software development. Also, it should be explicitated in documents of organizations to illustrate the Social Responsibility of banking. Future evaluations works will also contemplate the use of various browsers and devices.

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