

# Accessibility of Romanian Municipal Websites – Conformance with WCAG2

Costin Pribeanu, Maria Gheorghe-Moisii

ICI Bucharest, Romania

Bd. Maresal Averescu nr.8-10, Bucuresti

{pribeanu, moise}@ici.ro

Paul Fogarassy-Neszly

BAUM Engineering

Str. Traian Mosoiu nr. 8, 310175 Arad

pf@baum.ro

## ABSTRACT

Several initiatives at European level exist that promote e-inclusion and web accessibility. Despite all concerns, the accessibility of municipal websites is still low. This paper presents a study regarding the conformance of 60 municipal websites in 2014 with WCAG2 (Web Content Accessibility Guidelines). A comparison of results with similar data in 2011 shows a decrease in web accessibility that could be explained by the lack of regulations at national level and bad practices in web development. Moreover, the evaluation revealed instability of results in time which makes it difficult assessing the progress.

## Author Keywords

Web accessibility, WCAG2, accessibility checking tools, conformance, municipal websites.

## ACM Classification Keywords

D.2.2: Design tools and techniques. H5.2 User interfaces.

## INTRODUCTION

Ensuring equal access to the information technologies for all citizens requires identification and removal of barriers affecting their use of web by people with disabilities.

In 2006, the Riga Ministerial Declaration [15] expressed a political will of EU member countries to develop an inclusive IT to overcome exclusion and improve economic performance, employment opportunities, and quality of life. Two years later, the European Commission (EC) issued a document proposing measures to achieve an accessible information society [3]. A web accessibility study in EU countries revealed a low level of conformance with accessibility guidelines in 2009 [5]

Several initiatives at European level exist that promote e-inclusion in general and web accessibility in particular: the European Disability Strategy 2010-2020, the Action Plan for eGovernment 2011-2015, and the Digital Agenda for Europe, to mention just few. The European Commission (EC) proposed to ensure fully-accessible public sector websites by 2015 [4].

Starting with 2012, the basis of accessibility requirements is the Web Content Accessibility Guidelines (WCAG2) that was issued in 2008 by W3C (World Wide Web Consortium). WCAG2 specifies three levels of conformance (A - lowest, AA, and AAA - highest) [20]. For EU public websites the AA level of conformance is required.

Despite all concerns, the accessibility of public websites is still low. Several studies show that there is little progress in time. According to Hanson & Richards [7] some improvements seem to be related more to changes in web technology and coding practices than to adherence to accessibility guidelines.

In this paper a study regarding the conformance of municipal websites with the Web Content Accessibility Guidelines – WCAG2 is presented. The evaluation was carried on in 2014, on a sample of 60 municipal websites.

The rest of this paper is organized as follows. In the next section we present the main concerns and initiatives at international and European level as well as some recent results regarding the accessibility of Romanian public websites. Then the evaluation results are presented and discussed. The paper ends with conclusion and intention of future work.

## WEB ACCESSIBILITY

### Web accessibility initiatives

W3C launched the Web Accessibility Initiative (WAI) to develop strategies, guidelines and resources to support web accessibility [19]. Web accessibility means that people with disabilities can perceive, understand, navigate, and interact with the web.

An important step of this initiative was to develop web content accessibility guidelines. The first version (WCAG 1.0) was published in 1999 [20]. The second version was published in 2008 (WCAG 2.0) and this is the reference that is recommended for accessibility policies. There are four key principles that underlie WCAG 2.0: perceivable, operable, understandable and robust [21].

### Web accessibility in Europe

Many differences exist between European countries as regarding the regulations and measures for accessibility. According to the MeAC report [5] most countries have a strong policy on web accessibility for public websites. The average strength is between moderate and strong.

Nevertheless, the accessibility status was not good: only 12.5% of governmental websites passed the accessibility level A (automatic checkpoints) of WCAG1 in 2007 [5]. The evaluation was repeated in 2008 and 2009. In general, government websites are more accessible than other websites of public interest. As Cullen et al. [5] mentioned, although the results are showing progress, many websites fail to maintain compliance in time.

In 2012, the European Commission proposed a new directive to better support Member States to achieve their national commitment on web accessibility [4].

Monitoring web accessibility is the responsibility of each country. However, there are few accessibility initiatives that focus on municipal websites. Nietzio et al. [9] reported an accessibility initiative to improve accessibility of municipal websites in Norway. The eGovMon project aimed at integrating benchmarking in a collaborative framework including all stakeholders.

There are also few accessibility studies targeting the local e-government in Europe [8, 9, 10, 12, 13]. The work of Kopackova et al [8] on a sample of 39 Czech websites revealed that results in 2008 are worse than in 2006. Ruano [16] analyzed the development of information and communication technologies in Spanish municipalities. The results suggest a relationship between the population size and e-government capacity that is reflected in a higher compliance to accessibility rules for the websites of bigger municipalities.

### Web accessibility in Romania

Statistical data provided by the Romanian Authority for Disabled People (ANPH), for September 2014 mention 727,187 people with various disabilities, out of which 107,821 are visually impaired people (14.83%). Over 50% of them have severe visual impairments [1].

Although a concern for web accessibility exist, there is a lack of clear policies and action plans to improve it. There is no current action of monitoring the accessibility of municipal web sites. In the she study of Olsen from 2008, Romania was ranked the 22nd country in website accessibility [11].

Few studies are available that assess the conformance with WCAG2 of Romanian public websites. Studies focusing on municipal websites are even fewer and their results show that little progress has been made. The study of Colesca [2] shows that in 2007 most websites (88%) do not have alternative text for images.

Two accessibility evaluations checked the conformance with WCAG2 on a sample of 30 municipal websites in 2010 [12] and 2011 [13]. A comparison of results showed that accessibility is not preserved in time and several specific errors are varying in time and across the web site [13].

A recent accessibility study targeting the district websites in Bucharest (administrative divisions organized as municipalities) also revealed a low conformance with WCAG2 as well as low usability for the visually impaired user [14].

## EVALUATION RESULTS

### Method and instrument

The sample used in this study includes the first 60 Romanian towns ranked upon population, according to the 2011 census. The total population of these towns is 7862.1 thousands inhabitants which represents 39% from the total population of Romania.

The evaluation was carried on in November – December 2015. In order to test the degree to which accessibility is maintained each website was revisited three times in March 2015.

For each web site the home page was validated. We decided to evaluate only the homepage for two reasons. First, almost all pages have a header, a horizontal menu and one or two vertical menus on the left respectively right side. This organization is replicated on all pages of the website. Since the difference regarding the content between different web pages is relatively small, validating two pages would conflate the number of errors. Second, municipal websites have different information architectures. Apart from this lack of consistency which is perceived by a non-resident user, the differences in content diminish the relevance of comparison between websites for the second web page.

The conformance with WCAG2 (level AA) was assessed by using the Total Validator tool, v8.7.0. Total Validator (TV) is an accessibility checking tool for HTML code, broken links, WCAG1, and WCAG2 (any level). The tool is available on the web [16]. According to Vigo et al. [18] TV performs well across various types of website.

The accessibility score for WCAG2 conformance level A was computed as total number of accessibility errors level A. Accessibility errors level AA, HTML, and link errors were also collected.

### Summary of results

A summary of evaluation results is presented in Table 1 that includes total number of errors, number of websites with errors (N), maximum, average and standard deviation.

**Table 1. Summary of results**

Categories	Errors	N	max	M	SD
WCAG2 A	4876	60	495	81.27	107.99
WCAG2 AA	1334	36	361	37.06	64.37
HTML	11424	57	2338	200.42	342.18
Parsing	1033	45	128	22.96	38.65
Link	2010	52	366	29.49	74.82

A number of 57 homepages out of 60 have HTML errors. Five of them have more than 500 errors. There are also many homepages with parsing (N=45) and link errors (N=52). Another accessibility issue is the large number of links on the homepage that is varying from 41 to 627 with an average of 191.13 (SD=132.01). A number of 42 websites have more than 100 links on the home page which makes it difficult to use by people using a screen reader.

An analysis of results using Person correlation coefficient shows that the websites with many WCAG2A errors also have many HTML errors ( $r=.67$ ,  $p<0.01$ ), parsing errors ( $r=.34$ ,  $p<0.05$ ), and many links on the homepage ( $r=.29$ ,  $p>0.05$ ).

Overall, 4876 WCAG2 errors were detected. The average number of error per web page is 81.27 (SD=107.99) with a minimum of 1 and a maximum of 495 errors. Only 36 towns had WGAG2 AA errors with an average of 37.06 (SD=64.37).

A grouping of towns according to the total number of WCAG2A errors (accessibility score) is presented in Table 2. None of the home pages passed the lowest level of conformance. Only 8 (13.33%) websites had 10 errors or less. Almost all websites having up to 10 errors have no WCAG2 AA errors so the main conformance problems are related to level A errors.

**Table 2. Websites on total number of WCAG2A errors**

Accessibility score	Number	Percent
1-10 errors	8	13.33
11-20 errors	5	8.33
20-50 errors	19	31.67
50-100 errors	17	28.33
Over 100 errors	11	18.33
<b>Total</b>	<b>60</b>	<b>100.00</b>

The 11 websites in the last category have together 2832 WCAG2A errors accounting for 58% from the total.

### Main error types

A more detailed analysis of results reveals several aspects regarding the conformance to WCAG2 level A.

Most errors are related to the first WCAG2 principle (perceivable). The total number of errors is 3729 (M=62.15, SD=82.35) with a maximum of 464. From these, two error types are more frequent: the lack of text alternative for non-text content (20.16% from total) and the lack of text description for link (17.29% from total).

Other frequent accessibility errors are: tags instead of CSS (15.34%), improper ordering of heading elements (13.41%), and different links having the same link text (5.39%). The main WCAG2 error types are presented in Table 3.

**Table 3. Main types of WCAG2A errors**

Principle / Guideline	No	%
<b>1. Perceivable</b>	<b>3729</b>	<b>76.48</b>
Alternative text	983	20.16
Link description	843	17.29
Tags instead CSS	748	15.34
Headings ordering	654	13.41
Labels for controls	163	3.34
Table description	135	2.77
Title for controls	68	1.39
Other	135	77
<b>2. Operable</b>	<b>524</b>	<b>14.85</b>
Confusing links	263	5.39
Same link text	219	4.49
Stuttering effect	175	3.59
Other	23	0.47
<b>3. Understandable</b>	<b>73</b>	<b>1.50</b>
<b>4. Robust</b>	<b>613</b>	<b>12.57</b>
Total	4876	100.0

Most frequent error related to the third principle (understandable) is the lack of a mechanism that allows users to explicitly request changes of context. The error related to the last principle (robust) is the lack of unique IDs in a document, which accounts for 12.57% in the total number of errors.

### Comparison with 2011 data and discussion

A comparison with the results from 2011[13] is presented in Table 4. Overall, the total number of WCAG2 A errors in 2014 is higher than in 2011. The difference of 730 errors (17.6%) is pretty high and shows that municipal websites failed to maintain the accessibility level over time.

**Table 4. Number of WCAG2A errors - comparison with 2011**

Principle / Guideline	2014		2011	
	No	%	No	%
Alternative text	983	20.16	1242	29.96
Link description	843	17.29	395	9.53
Tags instead CSS	748	15.34	1016	24.51
Heading ordering	654	13.41	137	3.30
Unique IDs	613	12.57	118	2.85
Confusing links	263	5.39	661	15.94
Same link text	219	4.49	136	3.28
Stuttering effect	175	3.59	144	3.47
Labels for controls	163	3.34	103	2.48
Table description	135	2.77	75	1.81
Other	80	1.64	1403	2.87
<b>Total</b>	<b>4876</b>	<b>100.0</b>	<b>4146</b>	<b>100.0</b>

A comparison on the number of websites in a given error range is presented in Table 5. From the 12 municipalities with 10 errors or less in 2011, we found only 5 that maintain this accessibility level in 2014.

**Table 5. Websites grouping – comparison with 2011**

Accessibility score	2011	2014
1-10 errors	12	8
11-20 errors	5	5
20-50 errors	18	19
50-100 errors	11	17
Over 100 errors	14	11
<b>Total</b>	<b>60</b>	<b>60</b>

In order to check how accessibility is varying in a shorter period of time, the webpages were revisited weekly in March 2015. The total number of WCAG2A errors was with 123 higher at the end of March 2015 than in December 2014.

There are several factors that contribute to the low level of web accessibility.

First, there are no regulations at national level as regarding the conformance with WCAG2 guidelines. The existing accessibility guide (mandatory for public administration websites) dates from 2008 (issued by the Ministry of Communication and Information Technology).

Second, there is no accessibility statement on the websites. A good practice requires web developers to mention the level of conformance or at least an accessibility reference (e.g. WCAG1 or WCAG2).

Third, the developer is not always mentioned on the website. Only 25 out of 60 websites were developed by software companies that mentioned their name. A number of 7 websites were developed locally by the IT department of the municipality. For almost a half of websites it was not possible to find out the name of the developer.

Last but not least, it is apparent that there is no quality procedure that enforces the accessibility checking before a

new release or update. Moreover, the large number of link, parsing and HTML errors suggest that in many cases there is no testing at all. The instability of the accessibility level makes it difficult for the disabled user to find out what is new on the website.

There are some inherent limitations of this work. First, there are only 60 towns included in the sample and the selection was not random. Second, although the decision of validating only the home page was previously justified, relying on only one web page is an inherent limitation of the study [6]. Third, automated accessibility checking has its own limitations as highlighted by Vigo et al. [18]. Nevertheless, it is a cost effective method to monitor a large number of websites in a relatively short period of time.

## CONCLUSION AND FUTURE WORK

The main contribution of this paper is a wider picture of municipal websites accessibility. Overall, the accessibility of the municipal web is still low, with many errors that are violating the first principle of WCAG 2.0. In order to be used by people with disabilities, the web sites content has to be perceivable.

The results of this study should stimulate stakeholders to take measures in order to ensure the conformance level required at European level. The first priority is to establish clear accessibility requirements at national level. Previous evaluation results suggest that without regulations on web services procurement it is unlikely that a progress will be made in the next years. Second priority is to implement the COM 721 recommendation regarding the monitoring of web accessibility at national level [4].

The fact that accessibility is not preserved in time and that several specific errors are varying from month to month shows that user centered approach is not a practice in web development. A systematic software engineering approach requires testing for conformance before each new release.

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