

The impact of legislation on website accessibility: Croatian case-study

Ana Kešelj*, Iva Topolovac **, Matea Žilak** and Ivana Rašan **

* Department of Electrical Engineering and Computing, University of Dubrovnik, Dubrovnik, Croatia

** University of Zagreb Faculty of Electrical Engineering and Computing, Zagreb, Croatia

akeselj@unidu.hr, {iva.topolovac; matea.zilak; ivana.rasan}@fer.hr

Abstract - The potential of using the web as a support for people with disabilities has long been recognized. Given that the population is aging and life expectancy of people with disabilities has increased, it is important to take appropriate measures to ensure that all users have equal access to the digital services provided by the web. The importance of web accessibility has been recognized by many countries around the world, which have legislated how public content must be designed in order to be accessible. This paper provides information on how legislation has affected the accessibility of websites in Croatia. It also compares and discusses the results of the research conducted regarding the accessibility of the selected websites and the Croatian catalogue of websites.

Keywords - web accessibility; accessibility evaluation; impact of legislation; digital inclusion; digital accessibility

I. INTRODUCTION

Although concepts such as accessibility and universal design are even more popular today in the Republic of Croatia than they were in the past decade, there is still a significant need to emphasize the importance of implementing digital content under the auspices of these concepts. Today's society, on the one hand, promotes the acceptance of diversity and inclusion in every sense, on the other hand, there is still a significant need to point out what this general inclusion essentially means. When talking about a specific area such as the accessibility of the digital environment, it is important to point out that it already should be taken for granted today when it comes to its application in the development of digital content on different topics and subjects. In addition, it should be noted that in the context of an inclusive society and equal opportunities for all its members, where it is useful to take into account the need to take care of accessibility in general (architecture, etc.) and accessibility in the digital domain, this area is also defined by certain legal regulations that additionally emphasize the need to respect and comply with the elements of accessibility. When it comes to legislation related to the field of digital accessibility, at the level of

European Union, it is certainly worth highlighting the Directive (EU) 2016/2102 of the European Parliament and of the Council of 26 October 2016 on the accessibility of websites and mobile applications of public sector bodies¹, and in addition to the aforementioned directive, it is certainly worth highlighting the existence of the Web Content Accessibility Guidelines WCAG 2.0.² If we move to the level of the Republic of Croatia, we should certainly point to the Act on the Accessibility of Websites and Software Solutions for Mobile Devices from Public Sector Bodies (NN 17/19)³ in force from September 23rd, 2019, Proposal of digital accessibility standards developed by Croatian academic and research network - CARNET in cooperation with the Center for Research, Education and Application of New Knowledge UP2DATE, from 2019⁴. As part of the project jointly carried out by Croatian Regulatory Authority for Network Industries (HAKOM) and the Faculty of Electrical Engineering and Computing at the University of Zagreb (FER), which actively involved the end users of accessible content, i.e., people with different types of disabilities, a Methodology for the development of an accessible website was created⁵. The Methodology includes the following segments: understanding accessibility requirements; defining accessibility requirements; technology selection and implementation; evaluation and refinement of implemented accessibility.

According to the Methodology, within the first activity (phase) it is necessary to reach a consensus among all stakeholders involved in the development of the website and to take into account the fact that accessibility does not only refer to the installation of individual elements, but also to universal design as well as the application of accessible elements that satisfy as many end users as possible. The goal is to satisfy everyone but given the heterogeneity of requirements this is sometimes an unrealistic expectation. In addition, it must be taken into account that creativity is also recognized as one of the keys to success in the field of accessibility. Moreover, in this step, it is crucial to be well acquainted with the legislation relevant to a specific

¹ Directive (EU) 2016/2102 of the European Parliament and of the Council of 26 October 2016 on the accessibility of websites and mobile applications of public sector bodies, <https://eur-lex.europa.eu/eli/dir/2016/2102/oj>

² Web Content Accessibility Guidelines WCAG 2.0, <https://www.w3.org/TR/WCAG20/>

³ Act on the Accessibility of Websites and Software Solutions for Mobile Devices from Public Sector Bodies (NN 17/19), <https://www.zakon.hr/z/1929/Zakon-o-pristupačnosti-mrežnih-stranica-i-programskih-rješenja-za-pokretne-uredaje-tijela-javnog-sektora>

⁴ Proposal of digital accessibility standards developed by Croatian academic and research network - CARNET in cooperation with the Center for Research, Education and Application of New Knowledge UP2DATE, from 2019.

⁵ Methodology for the development of an accessible website, http://www.ict-aac.hr/images/HAKOM_skup/Metodologija/HAKOM_A5_Metodologija_FINAL_WEB.pdf

geographical area where the implementation of accessible solutions will take place. It is also good to consider the scope of accessibility, i.e., to define which communication barriers should be addressed to the greatest extent. In the second activity, it is necessary to define the basic design and software technology requirements, consider the content and user interactions, pay attention to colours, links and toolbar with accessibility options. The third activity involves the selection of technology and the implementation of accessibility requirements previously defined, as well as the implementation of basic accessibility guidelines and software enhancements. Finally, the fourth activity aims to verify the accessibility of the tools and evaluate the developed or improved accessible website. It is possible to use free tools such as AChecker⁶ and WAVE Web Accessibility Tool⁷, but it should be kept in mind that automated checks can only identify a limited number of problems, so to ensure a high level of quality user testing/evaluation is necessary

This paper analyses and shows the realistic situation regarding digital accessibility of selected websites available in the Republic of Croatia. It is important to point out that the field of accessibility is very complex and that certain deviations related to e.g., unsatisfactory compliance with the given accessibility criteria is to be expected. This Methodology is one of the key segments to achieve a meaningful development in this specific area, which can be confirmed by the following analysis. To achieve the best possible results in the field of digital accessibility, with legal frameworks as promoters, the mentioned Methodology is imposed as a very useful tool that can ensure and facilitate the development of high quality, accessible solutions.

II. ANALYSIS OF WEBSITES' ACCESSIBILITY IN 2020

Web Accessibility Initiative (WAI) is the World Wide Web Consortium's (W3C) effort to establish and promote accessibility standards and guidelines for people with disabilities (PwDs). As a part of WAI, a shared standard for web accessibility has been developed as Web Content Accessibility Guidelines (WCAG). The guidelines published in 2008, the WCAG 2.0, are categorized into three levels:

- A – minimum level of accessibility,
- AA – a website conforms to both A and AA, recommended conformance level,
- AAA – a website conforms to both A, AA and AAA, not recommended to be required as it is impossible for some sites to satisfy the AAA criteria entirely.

In the analysis of websites' accessibility described in this section, compliance with level AA of the WCAG 2.0 guidelines was tested.

Web accessibility evaluation tools are software programs or online services that help to determine if web content meets accessibility guidelines [1]. These tools are

based on automatic application of certain accessibility guidelines, without using artificial intelligence methods to achieve results. Therefore, it is necessary for expert to interpret the results and thus give them relevance. Such results are called potential problems. For example, it is up to the expert to decide whether the text in alt tag is meaningful enough and whether it describes the image accurately and well enough. As one of possible shortcomings, the authors in [2] state that most accessibility evaluation tools cannot detect these potential problems. The AChecker tool is used to evaluate HTML content by loading a website location, file or pasting HTML source code, after which the tool performs accessibility analysis and generates a report on identified accessibility issues that the selected site has, based on user-selected accessibility analysis reference rules. AChecker identifies 3 types of problems:

- *Known* problems – problems that are identified as obstacles to achieve accessibility,
- *Likely* problems – problems identified as possible obstacles to users during interaction with the websites,
- *Potential* problems – a problem AChecker cannot recognize [3].

Students of computing and electrical engineering studies from two Croatian universities who are enrolled in the courses related to the ergonomics, human-computer interaction, design for all and web accessibility were given a task to analyse websites with AChecker tool and present the results graphically with few sentences as a review of the conducted analysis. This tool was used because the aim of this research is to investigate the trend of websites' accessibility in Croatia by comparing the research results gathered using the same tool in 2012 and 2014. Also, to make the comparison as relevant as possible, the compliance level with the WCAG 2.0 guidelines (level AA) was used for analyses from different years. The websites given to the students for analysis were divided into five groups. Students selected a group by finding the module of their student ID with the number five. Each group is represented with the word MOD and with the number in range from zero to five. The types of problems which were taken into consideration were the problems recognized earlier and problems which were identified as potential problems. The focus was on previously identified problems.

First group consists of websites of television stations in Croatia such as Croatian Radio-Television (HRT)⁸, RTL⁹, Nova TV¹⁰, Sport TV¹¹ and one TV station by the choice of students. Television station with the least *known* problems is RTL, but it has many *potential* problems which need to be identified. Distribution of *known* problems and *potential* problems can be seen in Figure 1. It is important to emphasize that Croatian Radio-Television is funded by the Government of Croatia and therefore belongs to the websites covered by the Law on the Accessibility of Web

⁶ AChecker, <https://achecker.ca/checker/index.php>

⁷ WAVE Accessibility Evaluation Tool, <https://wave.webaim.org/>

⁸ Croatian Radio-Television, <https://www.hrt.hr/>

⁹ RTL, <https://www.rtl.hr/>

¹⁰ Nova TV, <https://novatv.dnevnik.hr/>

¹¹ Sport TV, <https://www.sptv.hr/>

Sites and Software Solutions for Mobile Devices of Public Sector Bodies.

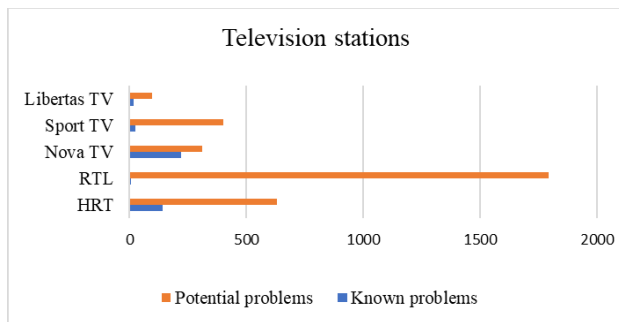


Figure 1 Distribution of *potential* and *known* problems of television stations

Web portals such as Večernji list¹², Jutarnji list¹³, Slobodna Dalmacija¹⁴, Glas Slavonije¹⁵ and Istarski.hr¹⁶ are represented in the second group. Figure 2 shows that the informative portal with no *known* or *potential* problems is Glas Slavonije while Jutarnji list and Slobodna Dalmacija have the most *known* problems, 105 of them.

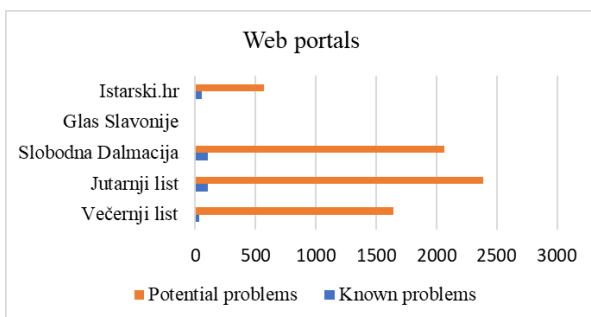


Figure 2 Distribution of *potential* and *known* problems of web portals

The next group consists of websites of Croatian State Administration Bodies. Websites which were analysed were Ministry of Defense (MORH)¹⁷, Ministry of Finance (MFIN)¹⁸, Ministry of Labour Pension system, Family and Social policy (MROSP)¹⁹, Ministry of Science and Education (MZO)²⁰ and Ministry of Health²¹. Figure 3 shows distribution of *known* and *potential* problems of the selected websites. Ministry of Defense has the most *known* problems while Ministry of Health has the least of them. Consideration should be given to the fact that law of accessibility only includes public sector bodies.

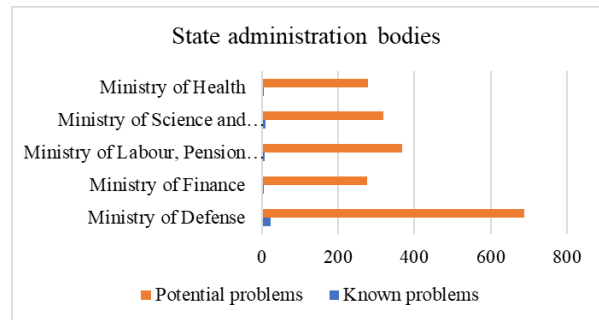


Figure 3 Distribution of *potential* and *known* problems of Croatian State Administration Bodies

Websites of Croatian State Administrative Organizations apply to fourth group. The selected websites are Central State Office for Sports²², Central State Office for Digital Society Development²³, State Office for Central Public Procurement²⁴, Central State Office for Reconstruction and Housing Care²⁵ and Central State office for Croats Abroad²⁶. Distribution of *known* and *potential* problems is shown in Figure 4 from which is seen that Central State Office for Reconstruction and Housing Care has the least *known* problems, only 4 of them, while Central State Office for Digital Society Development and Central State office for Croats Abroad have the most *known* problems.

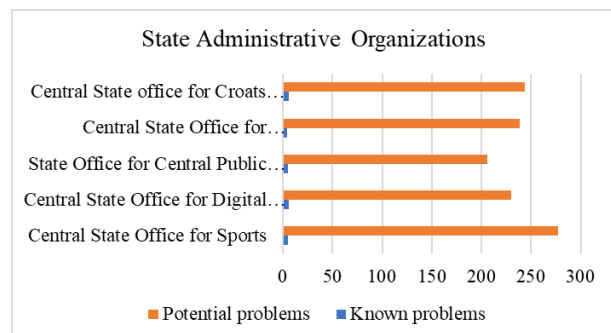


Figure 4 Distribution of *potential* and *known* problems of Croatian State Administrative Organization

The last group includes private companies' websites, such as Ericsson Nikola Tesla²⁷, Rimac²⁸, Školska knjiga²⁹ and Croatia Airlines³⁰. As it is shown in Figure 5, the company with the least *known* problems is Rimac and the company with the most *known* problems is Croatia Airlines.

¹² Večernji list, <https://www.vecernji.hr/>

¹³ Jutarnji list, <https://www.jutarnji.hr/>

¹⁴ Slobodna Dalmacija, <https://slobodnadalmacija.hr/>

¹⁵ Glas Slavonije, <https://www.glas-slavonije.hr/>

¹⁶ Istarski, <https://istarski.hr/>

¹⁷ Ministry of Defense, <https://www.morh.hr/>

¹⁸ Ministry of Finance, <https://mfjn.gov.hr/>

¹⁹ Ministry of Labour Pension system, Family and Social policy, <https://mrosp.gov.hr/>

²⁰ Ministry of Science and Education, <https://mzo.gov.hr/en>

²¹ Ministry of Health, <https://zdravlje.gov.hr/>

²² Central State Office for Sports, <https://www.sdus.hr/>

²³ Central State Office for Digital Society Development, <https://rdd.gov.hr/>

²⁴ State Office for Central Public Procurement, <https://sredisnjanabava.gov.hr/>

²⁵ Central State Office for Reconstruction and Housing Care, <https://sduosz.gov.hr/>

²⁶ Central State Office for Croats Abroad, <https://hrvatizvanrh.gov.hr/>

²⁷ Ericsson Nikola Tesla, <https://www.ericsson.hr/>

²⁸ Rimac, <https://www.rimac-automobili.com/>

²⁹ Školska knjiga, <https://shop.skolskajniga.hr/>

³⁰ Croatia Airlines, <https://www.croatiaairlines.com/>

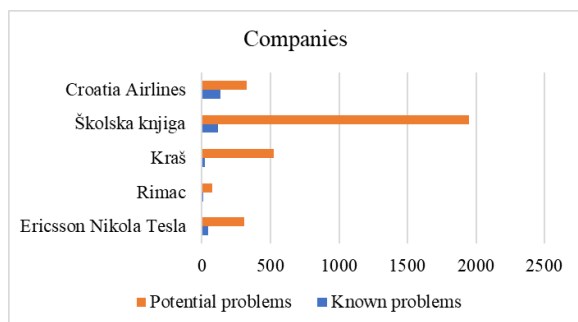


Figure 5 Distribution of *potential* and *known* problems of private companies

From this analysis, the difference between websites of state bodies and private sector is noticeable. Act on the Accessibility of Websites and Software Solutions for Mobile Devices from Public Sector Bodies adopted by Croatian Parliament has been in force since 2019, so state administration bodies and administration organizations are obliged to enforce legal provision while in the private sector it is still not mandatory. For this reason, third and fourth group have the best results regarding the numbers of *known* problems. Most common *known* problems on the websites were lack of alt attribute, blank label element, unidentified HTML lang attribute while the most common *potential* problems were too long attribute descriptions, documents missing a "skip to content" link, groups of links with related purposes were not marked, forms were not providing assistance such as error messages and error prevention.

III. DISCUSSION – WEBSITES’ ACCESSIBILITY TREND

A. 2012-2014 accessibility status

In 2012 [4] and 2014 [5], research was conducted to determine whether the Croatian websites under the www.hr domain catalogue³¹, conform to the above-mentioned WCAG 2.0 standard which was the latest standard at the time. The www.hr domain catalogue has over 25000 websites and is divided into categories such as government, education, tourism, entertainment, and others, all of which were equally represented in the sample used for the analysis. A set of randomly selected websites were analysed using the AChecker tool. This tool was selected because it was compatible with automatic analysis process used in this research (due to the large number of websites included in the analysis).

In the first iteration of the research, in 2012, one thousand (randomly selected) websites were sampled. However, 90 websites were excluded from the sample due to being unreachable. The second iteration included the same number of websites (910), randomly selected based on the same criteria (to equally represent every category from the www.hr domain catalogue).

The results for both iterations are presented in Table I and contain the information on two (out of three) levels of problems the AChecker tool (described in section II) identifies: known and potential. The websites were

analysed based on the recommended AA level of the WCAG 2.0 guidelines.

TABLE I THE AVERAGE NUMBER OF KNOWN AND POTENTIAL PROBLEMS IDENTIFIED BY THE ACHECKER TOOL ON THE SELECTED SAMPLES FOR TWO ITERATIONS

	First Iteration (2012)	Second Iteration (2014)
Total number of websites included in the analysis	910	910
The average number of the detected <i>known</i> problems	53.98	42.77
The average number of <i>potential</i> problems	281.01	257.247

In 2012, old and unpopular websites that were not adequately or at all maintained produced the most problems. Additionally, it is assumed that the developers and administrators of personal websites or small businesses were not aware of the problem of e-accessibility. The results of the second iteration were, yet again, hardly satisfying. The conclusion was drawn that web developers were working to fulfil the requirements of their clients while using modern technologies to reach as many users as possible not considering web accessibility at all. Even though accessibility guidelines were presented, and initiatives have been started, in 2014 there was still a lack of awareness about accessibility in the web development community.

B. Additional research from 2014

Given that the population aged 65 and older is growing faster than any other age group worldwide and that the number of people aged 80 years and older will triple, from 143 million in 2019 to 426 million in 2050 [6], it is not surprising that research efforts have been made on website accessibility to meet the needs not only of people with disabilities, but also of older people. For this reason, additional research was conducted in 2014 on the accessibility of websites visited by the older people in Croatia [7]. Although the research conducted in 2014 on the accessibility of the most visited websites of the Croatian catalogue of websites indicated that the design of websites in general (considering all categories of websites) does not take into account the needs of specific categories of users, this research placed a special emphasis on the assessment of websites most visited by the elderly population. Websites that are most visited by older people are those that provide information from which they can benefit, such as those related to pension payments, health insurance, care homes, but also various entertaining-informative websites (web portals). The analyses described below uses the results available from the 2014 research, and although the data are limited in the context of a number of potential problems, we decided to include the results from the two tools used in this research due to their relevance to the topic. To perform an evaluation of twelve websites selected as relevant for the elderly population in Croatia, the tools AChecker and W3C Markup Validation Service were used. Both tools evaluate HTML code according to WCAG guidelines, but unlike AChecker, W3C Markup Validation

³¹ Croatian website catalogue, <https://www.hr/katalog>

Service³² is a tool whose main goal is to help people who have difficulty tracking and finding content, as well as to help developers code more efficiently. It should be noted that at the time the tool was developed, the WCAG 2.0 guidelines did not yet exist, so the tool relied on the WCAG 1.0 guidelines for efficiency. The analysis of the website works in a similar way to AChecker. After the analysis, the tool provides a list of errors and warnings about parts of the web page that do not comply with the WCAG guidelines. The description of errors and warnings is detailed and provides suggestions on how to improve the code and the reasons why such a code is better. Validation of HTML code is very important as the presence of errors can cause the web page to behave differently on different browsers. Also, if there are errors or tags that are not part of the HTML specification, assistive technologies such as screen readers may not be able to interpret the content for the user even though these problems are not visible in the web browser.

The next table (Table II) shows the results of the accessibility evaluation performed on twelve selected websites, i.e., the number of known problems identified by AChecker and the number of errors and warnings identified by W3C Markup Validation Service.

TABLE II THE RESULTS OF PERFORMED ACCESSIBILITY EVALUATION OF WEBSITES VISITED BY OLDER PEOPLE IN CROATIA IN 2014

Website	W3C Markup Validation Service		
	Known problems	Errors	Warnings
http://www.hzzo.hr	7	5	2
http://www.vlada.gov.hr	3	7	1
http://www.azfond.hr	29	24	3
http://www.muh.hr	11	9	1
http://www.domovi-zastarije.com	6	14	94
http://www.dugzivot.com	4	11	11
http://www.centar-zdravlja.net	85	150	26
http://www.24sata.hr	45	170	97
http://www.hrt.hr	53	21	2
http://www.index.hr	13	157	173
http://www.jutarnji.hr	23	167	151

From the figures shown in the table, we can conclude that the trend of the accessibility status of websites visited mainly by elderly people, who are observed as a target group in conducted research, is the same as that observed for the number of websites from the www.hr catalogue. This means that the official websites of government institutions have the lowest number of problems and errors identified by both tools, while the tools identified a significantly higher number of problems and errors on the other websites. In addition, there is a significantly greater variation in the number of problems and errors identified by these two tools, which may be due to different categories of problems/errors that these tools identify. These results only confirmed that, in general, the websites of governmental administrative institutions are the most suitable for people with different needs (be it people with disabilities or elderly people), while the commercial

websites and different informative portals are identified as websites with more potential barriers for certain categories of users.

C. Final comparison

The next table (Table III) brings a comparison of the numbers calculated as the average number of the detected known and potential problems with the AChecker tool in 2012, 2014 and 2020 on the selected samples of websites. The goal of this comparison is to see if there is a trend toward better accessibility status over the years as well as with the adoption of the law related to web accessibility adopted by Croatian Parliament in 2019. As can be seen from the table, the average number of problems detected in 2014 is lower than in 2012, and although the number is lower, these results are also hardly satisfactory because the detection of known problems means that the website does not meet the “must have” accessibility features and therefore cannot receive a satisfactory grade. Therefore, the results are even more disappointing when looking at the figures from the 2020 column, which shows the average number of problems detected for the total number of websites included in this research, as the numbers have increased. Although the sample size of websites is not as large as the one from the previous (2012 and 2014) analysis, the sample includes categories of websites associated with state administration bodies and administration organizations that are required to enforce the accessibility law, and only these categories have fewer known problems than in previous years.

TABLE III THE AVERAGE NUMBER OF KNOWN AND POTENTIAL PROBLEMS IDENTIFIED BY THE ACHECKER TOOL ON THE SELECTED SAMPLES FOR RESEARCH CONDUCTED IN 2012, 2014 AND IN 2020

	First Iteration (2012)	Second Iteration (2014)	2020		
			Overall	By category	Website category
Total number of websites included in the analysis	910	910	25	5	
The average number of the detected <i>known</i> problems	53.98	42.77	65.4	82.6	Television stations
				59	Informative portals
				10	State Administration Bodies
				15.2	State Administrative Organizations
				65.4	Companies
The average number of <i>potential</i> problems	281.01	257.247	636.2	647.2	Television stations
				1332.8	Informative portals
				385.6	State Administration Bodies
				239.2	State Administrative Organizations
				636.2	Companies

³² W3C Markup Validation Service, <https://validator.w3.org/>

All this indicates that the websites affected by the new regulations have a rather stagnant trend in terms of accessibility, while the websites from other categories, such as private websites and informative portals, have a decreasing trend in terms of accessibility status.

The increasing number of problems can be partially explained by comparing web design trends. In the period from 2010-2015, flat design was very popular, the absence of shadow effects, used in previous years, and simplification of UI elements allowed web developers to focus on the content on the website [8]. Even though most developers were not aware of e-accessibility, the simplicity of the design trends presented fewer problems in conforming to accessibility guidelines. Few years into the future, in 2020, thanks to advances in web development tools, overlapping layers of UI elements and micro-interactions such as – page transitions, fading and sliding images, subtly animated graphics, hover elements and others are used more than before [9]. The new design trends pose a challenge for web developers trying to incorporate accessibility and may be the reason for the rising number of potential problems presented in this analysis.

The presented results included the analysis of websites in accordance with the WCAG 2.0 guidelines that were published in 2008 and are approved as an ISO standard (ISO/IEC 40500:2012). However, as the technology advances, so must the guidelines for content accessibility which is why in 2018 (WCAG 2.1) and in 2021 (WCAG 2.2) additional guidelines were published [10]. All of them are backwards compatible meaning that all content that conforms to WCAG 2.2 also conforms to 2.1 and 2.0. Comparing the WCAG 2.1 to the previous version, there are 17 additional criteria, the focus being mobile accessibility, people with low vision and people with cognitive and learning disabilities. The content of the most recent WCAG 2.2 is available as a working draft and the final version will include “success criteria” requirements. Furthermore, WCAG 3, temporarily referred to as “Silver” guidelines, is currently being drafted as a successor to WCAG 2.2. Considering the accessibility guidelines have extended the requirements of the WCAG 2.0, the current results of the analysis show there is an urgent need for raising awareness about digital accessibility.

It is also important to note that, just as accessibility guidelines must keep pace with advances in technology, so accessibility checker tools must keep pace with new versions of accessibility guidelines. This main tool used in this research is the AChecker tool which was announced to shut down on April 30, 2021. Since AChecker also does not check WCAG guidelines above 2.0, newer tools will need to be used for future work for evaluation of the websites' accessibility, such as WAVE or Accessi³³.

IV. CONCLUSION

Considering the analysed data in this paper, it can be concluded that shifts are taking place and that legislation is still a factor that has a positive effect, i.e., contributes to changes. Although this is the case, sometimes even legal regulations are not strong enough to stimulate and implement the necessary actions in the field of accessibility, from which it can be concluded that for active and purposeful action in the field of accessibility, it would be good to act in other ways to raise awareness of the importance of digital and architectural accessibility for people with disabilities and how much its implementation can positively contribute to increasing the quality of life for all, especially for people with different types of disabilities. The results of the study suggest that there is still much to be done in the accessibility field and that work needs to be done to improve the accessible content currently implemented in order to minimize the occurrence of errors.

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³³ Accessi.org, <https://www.accessi.org/>