IO1 - A1 Desktop research: The analysis of digital accessibility skills, training, job roles, best practices

Certified Digital Accessibility Training Project

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1. Introduction

The web is an increasingly important resource in many aspects of private and professional life - in domains such as education, employment, government, commerce, health care, recreation, access to information and more. Transferring activities into the digital environments produced a digital gap between people who have access to the Web and those who do not. Especially with progress in mobile technologies this gap became narrower and access to the web, at least in public places, has been assured to anybody with the basic digital skills, however, not necessarily to people with disabilities. Additionally, during the years web-based information resources have shifted from 'a simple text interface' to an interactive and dynamic one. While this shift has been shown as beneficial for majority of people, it has excluded many others because of their inability to use standard methods of access (Brophy & Craven, 2007). According to research (Brophy & Craven, 2007), people with disabilities are most at risk of being excluded from having an internet access, especially people who are visually impaired or blind and who use assistive technologies. Therefore, it is essential that the web is accessible in order to provide equal access and equal opportunity to people with various disabilities, and to be interpreted by any kind of accessible technology. This way, people with disabilities can also participate in society more actively.

Persons with disabilities in Europe are a significant group. Around 80 million people in the EU are affected by a disability (European Commission, 2015). As the EU population ages, the figure is expected to increase to 120 million by 2020. This means that more and more people will have problems to access information and to work with it. For them, equal integration into society, including digital access, can be a real challenge (European Parliament, 2014; European Commission, 2015).

According to the EU Parliament (in Media Access Australia, 2014; Flynn, 2016), only one-third of the 761,000 EU public sector websites meet basic web accessibility standards. In its estimation, more than 167 million EU citizens have difficulty in accessing public websites to use online public services. Furthermore, they represent a huge market potential for businesses which use digital approaches and therefore possible economic gains by reaching a larger customer base.

Digital accessibility is becoming a must. The directive (EU) 2016/2102 on making the websites and mobile apps of public sector bodies more accessible was recently published (on 2 December 2016) and entered into force on 22 December 2016 (Member States had until 23 September 2018 to transpose the text into their national legislation). Therefore, it is important that website developers, designers, marketing and public relations personnel as well as managers and policy makers, have knowledge and skills for improving accessibility for disabled visitors of their websites/ mobile apps.

The aim of this paper is to address the knowledge, skills and competences that key stakeholders (managers, web designers, web content authors and editors, people from the field of marketing and PR, IT developers, policy makers) need according to the Web Content Accessibility Guidelines (WCAG) in order to

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respond to the needs of people with various disabilities to fully participate in the Web environment and benefit from the digital era. Furthermore, the research of jobs, training and best practices is presented in order to depict the current state of the digital accessibility field in the world, and to serve as a foundation for future development of the field. A proposal of certified digital accessibility training project is introduced.

2. Creating accessible web content

Web content represents the information, features and services that are provided on the website (Huizingh, 2000). However, web content is accessible only if people with disabilities are able to access it (WAI, 2018). Therefore, it is crucial for people who write and organize web content, such as web content authors, publishers, web editors, PR and marketing professionals, to create content that meets Web Content Accessibility Guidelines (WCAG) requirements and is accessible to people with disabilities (WAI, 2018).

The general aim is to create web content which is perceivable, operable, understandable by the broadest possible range of users, robust and compatible with their wide range of assistive technologies, screen readers in particular (Caldwell, Chisholm, Vanderheiden, & White, 2004; WAI, 2018; How to Meet WCAG 2, 2018). Perceivable means that the information and user interface components must be presentable to users in ways they can understand using one of their senses. Operable means that the users must be able to interact with the site and all of its features. Understandable means that the content and functionality should be easy to follow. Robust means that sites should work with various technologies and consider future technologies (University of Minnesota, 2018).

In addition to getting information from a web page, people with disabilities have to be able to use all the functions available for non-disabled users such as buttons, links, form controls, etc. There should be alternatives to pure visual content for people who cannot see and alternatives to pure auditory content for people who cannot hear (Thatcher, 2006). People responsible for creating accessible web content have to possess some of the skills and knowledge explained below.

Skills needed for creating accessible web content

Ability to write accessible web content

A web content author should be able to write web content that is clear, simple and concise in order to be accessible (Conti, 2016; WAI, 2018). Formatting and language used should be simple and appropriate for the context. Sentences and paragraphs should be clear and short. Unnecessarily complex phrases and words should be avoided. An additional glossary should be provided for terms that are difficult to understand or unknown to the readers. Acronyms on their first use should be expanded. Appropriate list formatting should be used. For better clarity of meaning, images, illustrations, video, audio and symbols should be provided (WAI, 2018). Instructions,

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guidance, and error messages should be clear and easy to understand. Unnecessary technical language should be avoided. Input requirements, such as date formats, should be described (WAI, 2018).

Ability to write appropriate alt-text for non-text content

A web content author should know how to provide text alternatives for all non-text content such as buttons, images, or design elements that are presented to the users (Conti, 2016; W3C, 2018). Text alternatives should serve the equivalent purpose to non-text content and should be adaptable and easily changed into other forms people need, such as large print, braille, speech, symbols or simpler language'' (W3C, 2018). Every image, except for the ones with purely decorative purposes, should include text alternative that is meaningful and provides its information or function (Conti, 2016; WAI, 2018). A lack of alternative text makes content less informative or not understandable (Conti, 2016).

Ability to create concise transcripts and captions

Captions are text versions of audio content synchronized with video and represent a crucial point in understanding the video content for people who are deaf or have hearing impairment. Furthermore, they can be useful for non-native speakers, those who are not used to the accent of the speaker, those who are unfamiliar with specific terms used in the video, or for those who are trying to watch the video in a noisy environment (Conti, 2016).

Transcripts represent a text version of an audio or video content and are useful in situations when you cannot access the audio or video content and enable users to search for specific words or phrases in the text (Conti, 2016). Transcripts should be provided for audio-only contents, such as podcasts. Furthermore, captions and transcripts should be provided for audio and visual content, such as training videos, and for spoken information and sounds that are relevant for understanding the content, e.g. 'door creaks'. Video transcripts should also provide descriptions of the relevant visual content, such as 'Athan leaves the room' (WAI, 2018).

Knowing how to organize and structure a web page

- **Choosing and writing accessible web page titles**

A web content author should know how to choose and write appropriate titles for a web page. Page titles should be short, informative and unique (WAI, 2018). They need to describe the content of the web page and at the same time differentiate the page from the others. The page title and the main heading of the page are often the same, therefore the most important information should be written first e.g. the name of the page should be written before the name of the organization (WAI, 2018)

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- **Using appropriate headings**

Furthermore, a web content author should know how to use a proper heading. Headings should convey meaning and structure to pages (Conti, 2016; WAI, 2018). Short headings should be used to clearly describe and group associated paragraphs. Good headings organize and outline the content (WAI, 2018). With proper assistive technologies and browsers, one can easily jump from heading to heading to find the section they are looking for and save time by not reading unnecessary content (Conti, 2016).

Ability to create proper links

It is important to know how to create proper and not confusing links. Link texts should be meaningful, short and should describe the content of the link target (Conti, 2016; WAI, 2018). Ambiguous link text, such as 'click here', 'read more' or 'link'' should be avoided. Important information about the link target should be better indicated (Conti, 2016; WAI, 2018).

To sum up, accessible web content authors should have technical skills that enable creating accessible websites with accessible images, enriched by alternative text for images, accessible headings, accessible links, accessible colors and contrasts (Osborne, 2015; Sailer, 2018), and accessible tables (Web Accessibility Tutorials, 2018). For videos and other multimedia, web content authors should be capable of providing a text equivalent, which includes captions and a script or transcript for all audio and video files accessible. Moreover they should have skills to make the equivalent for maps (Digital Standards, 2018; Tips for Getting Started Writing for Web Accessibility, 2018) and they should be qualified to deal with difficult document formats for attachments, avoiding difficult formats where possible. Additionally, accessible web content authors should be prepared to make the document accessible by using Microsoft Word files rather than PDFs. They should have special skills to make PowerPoint, Excel and email documents accessible, provide alternatives for Portable Document Format (PDF) such as a compliant HTML and improved PDF accessibility (Digital Standards, 2018).

3. Developing for digital accessibility

In the 21st century skills that are required to be a qualified web developer have extended beyond standard definition. Standard knowledge of web programming which is mostly divided in programming frontend, backend and design has been extended by programming for accessibility. Modern day programmers should know the following necessary standards and guidelines that will enable them to develop accessible web solutions that can be used by everyone:

- Web Content Accessibility Guidelines (WCAG, 2018)
    - Explains how to make web content more accessible to people with disabilities. The focus is on web pages and web applications.

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- Web Accessibility Initiative Accessible Rich Internet Applications (WAI-ARIA, 2018)
    - Defines a way to make web content and web applications more accessible to people with disabilities. Not only a standard but also a framework. Particularly useful for dynamic content and advanced user interface controls developed with Ajax, HTML, JavaScript, and related technologies.
- User Agent Accessibility Guidelines (UAAG, 2018)
    - Explains how to increase accessibility of user agents (browsers, browser extensions, media players, readers and other web content rendering applications).
- Authoring Tool Accessibility Guidelines (ATAG, 2018)
    - Explains how to make the authoring tools accessible, so that people with disabilities can use them and helps authors create more accessible web content.

To ensure the programmers competency in web accessibility they need to understand both the theoretical background and content of above-mentioned standards and also the technological realization of the individual guidelines. The main skills on the highest level of abstraction are presented below.

Understanding digital accessibility

The first step in programming for digital accessibility is the understanding of the following topics, the knowledge and understanding of web accessibility, it's benefits, what web accessibility means for people with disabilities, what are components of web accessibility and general guidelines regarding web accessibility. The whole WCAG standard and knowledge of design principles, guidelines, techniques and criteria are necessary (Introduction to Web Accessibility, 2018).

Managing the technical aspects of web accessibility

This is the planning phase of developing for web accessibility. In this step, the focus is on how to create a plan for implementing web accessibility and planning requirements for accessibility policy in an organization. Strategic decisions of selecting authoring tools, content management systems and evaluating tools for checking web accessibility are taken into consideration (Managing Web Accessibility, 2018). The process should include all the stakeholders, including the programmer who will have to work with the selected tools in all the future phases of software development and maintenance.

Accessible web content

The developer should understand the requirements of web content (text, colors, presentation) and how to make web content readable and understandable (Designing and Developing Accessible Websites with WCAG, 2018). Despite the developer not creating web content he/she has to prepare all the necessary features that will easily be used by web editors. The developed solution must allow for describing non-text content (e.g. alt-text for

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images), organization of a page in headings, labels, displaying content in such a way that orientation of the device is not restricted (unless essential). Input fields must be implemented in such a way that their purpose can be programmatically determined. Focus and on-hover of elements should provide and be allowed to provide additional feedback. Changing line height (1.5 font size), word spacing (0.16 font size), letter spacing (0.12 font size) and spacing (2.0 font size), to increase readability, should not lead to loss of content or functionalities. Status messages should be programmatically determined and presented to users by assistive technologies.

Accessible visual web design (and CSS)

A programmer has to possess understanding of how HTML elements should be visually presented in the web pages (Visual Presentation, 2018). As such the most crucial aspects that must be managed for accessibility of visual design are use of colors and contrast (ratio at least 3:1 against adjacent colors), resizability of the page and text on the page, eliminating unnecessary movement on the sites (from scrolling texts, animations, flashing) and allowing to pause, stop or hide movement or changes on the page. Users should be warned about any data loss that may occur due to timeouts. All functionalities must also be able to be operated with a single pointer, without gestures, device and user motion unless they are essential. All targets and pointer inputs (e.g. buttons) have to have large enough sizes.

Creating accessible images

A programmer has to ensure that uploaded images can be enriched with metadata (Image Concepts - WAI Tutorials, 2018) so that they can later on be understandable for people with various disabilities (e.g. using screen readers, using speech input software, browsing speech-enabled, mobile web pages and outside user agents, such as search engines). As such the solution must allow different treatment of images (informative, decorative, functional, text, complex images, groups of images and image maps). This will allow for their meaning to be conveyed to users which can only access the raw text and metadata of the website.

Creating accessible multimedia materials

A programmer must develop or use pre-existing solutions to enable insertion of prerecorded captions, audio descriptions and sign language captions in multimedia content (audio and video content in most cases). In cases of live (stream) videos programmer must ensure live captioning by the use of automated software or allow introduction of a short delay during which captions can be provided (Time-based Media, 2018).

Accessible page structuring

A web developer must know how to structure a website into page regions, which are labeled and allow distinction (Page Structure Concepts - WAI Tutorials, 2018). Web page content should contain headings and labels based on their relationships and importance. The page structure must enable content to be presented

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without requiring scrolling in two dimensions, as such it must be able to fit in one of the two dimensions width 320 CSS pixels, height 256 CSS pixels.

Site navigation and orientation

A developer must create accessible site navigation allowing multiple ways for users to reach the same point on the website. The implemented navigation elements have to be meaningful, menus should allow use by either mouse or keyboards, navigation has to function in the same way (consistently) through the site (Menus – WAI Tutorials, 2018). The purpose of user interface components, icons and regions has to be programmatically determined using markup languages.

Creating accessible tables

A programmer must enable suitable presentation of data in tables, this is done by enabling the use of table markup, scope attributes, caption attributes and summary attributes (Tables Concepts - WAI Tutorials, 2018). Data cells should allow association with header cells by using id and header attributes.

Creating accessible forms

Developed solution must enable accessible forms (Forms Concepts - WAI Tutorials, 2018) which can be used on any device (computer, mobile) and with any assistive technology (screen reader, speech reader, …). Furthermore, the programmer must ensure that forms identify user input errors and notify the users of any wrongful input and must provide the necessary help that provides the users with context. Use of descriptive labels or instructions for each field should be used in forms. The form must support saving and later completion from a previous point.

Basics of accessible scripting and WAI-ARIA (Accessible Rich Internet Applications)

The programmer must possess advanced knowledge of ARIA elements and scripting techniques used in web applications to increase understanding of client side user interfaces for users with disabilities, users using assistive technologies and users using keyboards to use websites (WAI-ARIA 2018).

Mobile accessibility

Programmer must ensure that the software solutions are also accessible if they are intended for other than PC devices meaning phones, tablets, digital TVs, wearables and Internet of Things devices generally (Mobile Accessibility, 2018). Some of the specifics not found in computer solutions are adaptations for touchscreens, small screen sizes, different inputs (e.g. voice, 3D touch), that allow uses in different environment brightness settings (e.g. bright sunlight). It may be necessary to implement zoom and contrast options, touchscreen gestures, changing orientation mode (portrait/landscape), virtual keyboard (for touch input). The developer must also ensure that important page elements are positioned before the need to scroll the page, buttons should be accessed easily (e.g. on the side of the screen and not the middle).

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Accessibility conformance evaluation

The developer must be familiar with using automated tools for accessibility testing, formal conformance evaluation methods and user testing (Understanding Conformance, 2018). He/she needs to understand the three levels of WCAG conformance (A, AA, AAA) and practices minimum to ensure them. In addition to that evaluation is only possible by exploring the website and identifying its key functionalities, selecting representative sample of site content (if the site is too big), evaluating and identifying successful and failed implementation and practices on the web site with regards to web accessibility and how to report the evaluation findings.

4. Designing for digital accessibility

The mandate of web designers is not simply to adopt and extend established creative principles for online communications. They have a moral obligation to create sites whose content is accessible to all users, regardless of their physical or cognitive abilities, their technological requirements or their cultural background, education and experience. When websites are properly designed, written and programmed, they offer universal access to information and functionality. Therefore they should develop some fundamental skills on how color, contrast, text size and many other aspects of visual design affect how people with different abilities interact with web products.

Ability to provide sufficient contrast between foreground and background

Web designers should ensure adequate color contrast between foreground and background to improve information access for people in various contexts and conditions (e.g. color blindness, low-vision, age-related vision issues, monitors with incorrect color rendering). They should be familiar with the W3C Web Content Accessibility Guidelines 2.1 requirements where color combinations meet clearly defined contrast ratios. In order to meet the guidelines at Level AA, text or images of text must have a contrast ratio of at least 4.5:1 (or 3:1 for large text). In order to meet the guidelines at the stricter Level AAA, the contrast ratio must be at least 7:1 (or 4.5:1) for large text. Web designers should be able to use various color contrast checkers online to verify their color contrast ratio (e.g. Colour Contrast Analyser, and Colour Contrast Check Tool).

Conveying Meaning through Color

Web designers should avoid using color alone to communicate information as some users are unable to perceive color differences, or may not perceive color the same way (e.g. people with low vision, color blind, elderly, people with situational disabilities). When using color to differentiate elements, they should be able to provide additional identification that does not rely on color perception, such as the use of an asterisk in addition to color to indicate required form fields, and use labels to distinguish areas on graphs (WCAG, 2018).

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Supporting the ability to resize text

Web designers should know how to design well-crafted, flexible pages that accommodate different text sizes while keeping its overall integrity. They should enable users to resize text on a web page up to 200 percent without loss of content or functionality, without requiring the use of assistive technology such as a screen magnifier.

Ability to create accessible images

Web designers should be able to provide text alternatives (alt-text) for images (Image Concepts - WAI Tutorials, 2018) in order to ensure that images can be understandable by people with various disabilities (e.g. using screen readers, using speech input software, browsing speech-enabled websites, mobile web pages and outside user agents, such as search engines). Designers should provide appropriate text alternatives taking into the purpose of images: informative, decorative, functional, images of text, complex images, groups of images, image maps.

Ensuring that interactive elements are easy to identify

Web designers should know how to provide distinct styles for interactive elements, such as links and buttons, to make them easy to identify. They should know how to change the appearance of links on mouse hover, keyboard focus, and touch-screen activation. They should ensure that styles and naming for interactive elements are used consistently throughout the website.

Ability to provide clear and consistent navigation options

The web designers should understand the requirements on how navigation across pages within a website has consistent naming, styling, and positioning. They should provide more than one method of website navigation, such as a site search or a site map. Help users understand where they are in a website or page by providing orientation cues, such as breadcrumbs and clear headings.

Ability to ensure that form elements include clearly associated labels

Web designers should ensure that all fields have a descriptive label adjacent to the field. They should know that for left-to-right languages, labels are usually positioned to the left or above the field, except for checkboxes and radio buttons where they are usually to the right. They should avoid having too much space between labels and fields. Therefore, web designers should be familiar with techniques to ensure that the label for any interactive component within Web content makes the component's purpose clear (e.g. Online maps with controls for zooming in and out, A form asking the name of the user, A form with required fields).

Ability to use headings and spacing to group related content

Web designers should be familiar on how to use whitespace and proximity to make relationships between content more apparent. Style headings to group content, reduce clutter, and make it easier to scan and

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understand. Web designers should be familiar with techniques that ensure that sections have headings that identify them. They should have extensive knowledge of HTML heading elements (h1, h2, h3, h4, h5, and h6).

5. Implementation of digital accessibility

The expansion of information in electronic format does not guarantee its accessibility. There has been a growing number of significant laws and standards about web accessibility in order to help people with disabilities to fully participate in the web environment (Yu, 2002). However, the implementation of these laws and standards is still lacking. To be successful, digital accessibility implementation must be well grounded in organizational culture, process, and practice. This means aligning digital accessibility with existing organizational approaches, developing and communicating clear, measurable objectives, and engaging stakeholders to secure understanding and broaden support throughout the organization. Therefore, it is important that everyone involved possesses skills related to digital accessibility (WAI, 2002).

Below are listed skills needed for implementing digital accessibility in organizations.

Ability to develop a digital accessibility implementation plan

An accessibility plan outlines the plan of action and steps that an organization will take in order to prevent or remove barriers of accessibility. Written multi-year accessibility plans have to be created, updated at least once every five years and posted on an organization's website. This can help an organization to meet its policy commitments. The list of priorities, which includes legal requirements that have not been met, as well as the barriers that have been identified as a priority for removal, has to be reviewed. The next step in this process is to develop strategies to address an organization's priorities. An organization does not need to remove all the barriers immediately, but it should be strategic about which ones to tackle first. Nevertheless, the legal requirements have to be met.

The following activities need to be considered when determining implementation strategies (Ontario.ca, 2019):

- **(1) Consulting the experts**: People with disabilities should be consulted throughout this process. People with disabilities are often knowledgeable about removing the barriers that affect them.
- **(2) Allocating resources:** The human, financial, and technical resources needed and available have to be estimated.
- **(3) Assigning responsibility**: The decision about which employee or department is to lead and execute the organization's plan of action has to be taken.
- **(4) Deciding on a timeline**: A work schedule that aligns with compliance deadlines for European digital accessibility laws and an organization's priorities has to be developed.

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Ability to develop organizational policies on digital accessibility

Digital accessibility policies are formal rules that serve as a tool for achieving an organization's digital accessibility goals. Written accessibility policies have to be created and made available to the public. An organization needs to know the content and meaning of digital accessibility policies and legislation that they are obligated to follow. For example, 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 bodies (Text with EEA relevance) should be known and implemented by the applicable organizations (Ontario.ca, 2019).

Ability to improve digital accessibility of an organization's existing website

The digital accessibility barriers should be looked for in all departments of an organization. Policies, procedures, programs and services should be included. A communication with people with disabilities should be performed in ways that take into account their disability. When requested, information about an organization and its services, including public safety information, in accessible formats or with communication support should be provided. Furthermore, internationally-recognized WCAG 2.0 Level AA website requirements in accordance with European's accessibility laws should be met (Ontario.ca, 2019).

Ability to select authoring tools and content management systems

ATAG consists of a set of techniques to help software developers implement the guidelines when developing authoring tools, including content management systems (CMS), WYSIWYG ("What You See Is What You Get") tools, save-as-HTML conversion tools such as word processors, database-generation tools, and site management tools.

For authoring tool developers it is important to take into account the following rules when making their products: supporting accessible authoring practices; generating standard markup; supporting the creation of accessible content; providing ways of checking and correcting inaccessible content; integrating accessibility support into the overall look and feel of the product; promoting digital accessibility, and ensuring that the tools are accessible to people with disabilities (Ontario.ca, 2019).

Ability to select evaluation tools for checking digital accessibility

Web accessibility evaluation tools are software programs or online services that help determining whether the website meets digital accessibility guidelines. Digital accessibility evaluation tools can help to quickly identify potential accessibility issues. They can be used through all the phases of the web design and development process. Tools can provide fully-automated checks, and help one perform a manual review. However, all web accessibility aspects cannot be checked automatically because evaluation tools can provide false or misleading results. Human judgement is required and evaluation tools can only be used to *assist* (Ontario.ca, 2019).

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Ability to undertake and document a preliminary check for digital accessibility

Managers and decision makers should be able to:

- Explain the importance of web accessibility for people with disabilities and older people
- List common barriers experienced by people with disabilities and older people
- Describe the business case that influences an organization's web accessibility efforts

Authors and non-technical developers should be able to do above and also:

- Explain the role of the WAI guidelines and other components in achieving an accessible web
- Apply basic principles of accessibility during the preparation of web content
- Carry out preliminary checks of websites for accessibility and communicate the results

Website developers and application programmers should be able to do above and also:

- Utilize WCAG 2.0 and its supporting documents as a guide of implementing accessible websites
- Apply WCAG 2.0 techniques to develop accessible layouts, forms, tables, and other content
- Evaluate websites for conformance with WCAG 2 and communicate the results (Ontario.ca, 2019).

6. Evaluation of digital accessibility

Considering evaluation criteria of digital accessibility, it is imperative to look at the data provided by established evaluators first. Polish Supreme Audit Office in its report on the accessibility of various government and local government websites (Realizacja przez podmioty wykonujące zadania publiczne obowiązku dostosowania ich stron internetowych do potrzeb osób niepełnosprawnych, 2015) points out to 4 problems in regards to implementation of WCAG standard: (1) Lack of skills and knowledge of involved staff on behalf of government and local government, resulting in acceptance of, (2) subpar quality of WCAG standard implementation by external contractors, (3) errors that occurred during data migration or content creation, and (4) lack of funds and insufficient support from the authorities.

Those problems can be translated into 2 problem areas:

A. (1) and (2) shows lack of skill and knowledge of WCAG standard;

B. (3) and (4) shows failure to understand the importance of the standard.

Because of the fact that creation of WCAG standard-compatible digital content is more cost consuming (both resources and time), it is obvious that there will be financially-motivated resistance to the proper implementation of accessible solutions. Therefore it is imperative that the person involved in evaluation of

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digital accessibility is capable of judging the product at hand through the lenses of WCAG standard principles (perceivable, operable, understandable, robust) (How to Meet WCAG 2, 2018), but also capable of understanding the importance of the issue on the humanitarian level. And while empathy as a skill might seem nebulous, it can be translated into practices and procedures that ensure, at the very least, major improvements of evaluation techniques. However, it shouldn't be overstated. As WCAG standard and technology progresses, empathy as a skill is flexible enough: it won't get „outdated", because it's not based on any currently applicable version of the WCAG standard or relevant software. Therefore it should be advised that every person applying for the position of digital accessibility tester or evaluator had some background in empathy-building activities and training. Having any background experience in working with people with disabilities can also be seen as a boon, as it might translate into understanding of special needs of people with certain disabilities.

7. Analysis of jobs, training, best practices

To illustrate the current state of the digital accessibility field in the world and the urgent need for its development and implementation, analysis of available job positions, training and best practices was performed.

a. Jobs

As a result of the analysis, many current and possible future and digital accessibility job roles and specializations have been identified. It should be noted that this is not a closed list. In most cases, these content are announcements of vacancies posted by organizations seeking specialists through popular recruitment portals (LinkedIn, Indeed, Monster). It is worth noticing that these are not only public sector entities that are obliged by the WCAG 2.0 or WCAG 2.1 guidelines, but above all the private sector. In this case, there is no such standard imposed. This may indicate an increase in the importance of this subject among entrepreneurs. The most frequently mentioned professions related to digital access are: digital accessibility specialist/manager, web accessibility coordinator or accessibility consultant. These are not just technical positions but also managerial positions like the director of digital accessibility (Glassdoor, 2018). It is worth noticing that most of these ads are generated by companies from the US and Canada. This may indicate that this problem is more dealt with there than in Europe. It is likely that in the near future there will be more and more job offers for emerging positions related to digital accessibility.

Considering job offers for digital accessibility testers, there is currently a growing market for it that is yet to reach its saturation. Most commonly listed requirements for the position of Accessibility Tester or Accessibility QA Analyst are related to knowledge and skills in regards to WCAG, Section 508 (Amendment to the Rehabilitation Act), WAI-ARIA, in terms of specialized skills required. On top of that, other skills related to web design testing are required, such as experience in related testing jobs, B.A. or B.S. in computer science or other related fields, extensive knowledge of HTML etc. Job listings based around evaluation of digital accessibility tend

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to focus on compliance with the law and global standards being implemented. What's interesting is the requirement to comply with conformance level AA, as a standard requirement. It is the fact that conformance level AAA cannot always be pursued due to the nature of website's contents, but it seems that industry standard are established on the AA level with no motivation nor strive for improvement.

b. Training

An analysis of existing training showed that the number of web accessibility training and courses has been increasing. Education of web accessibility is carried out both by universities (e.g. Bennett, 2014; Ortner & Miesenberger, 2005; Central Washington University, 2018; Georgia Institute of Technology, 2018; Media Access Australia, 2018; University of Illinois, 2018) and by private organizations (e.g. OLC Institute, 2018; Level Access, 2018; WebAIM, 2018). Some of the training is payable and some is provided free (e.g. Udacity Web Accessibility, 2018; Ryerson University & Canvas.net, 2018).

The common objective of all training and courses is to teach participants how to design and develop the websites and how to provide and improve web accessibility for people with disabilities. Reviewed courses are based on either WCAG standard or WAI-ARIA or even both (e.g. Canvas, 2018; Ryerson University & Canvas.net, 2018). Some courses include only the theoretical details of web accessibility (e.g. Bureau of Internet Accessibility, 2018), while others are strictly technically oriented. The latter are usually divided into specific content areas (e.g. emphasis on ensuring the accessibility of video with HTML and CSS (Green, 2018), accessibility of PDF files (Chelius, 2015)) and/or linked to:

- specific programming languages (e.g. JavaScript (Ryerson University & Canvas.net, 2018)),
- specific markup languages (e.g. HTML (Ryerson University & Canvas.net, 2018)),
- specific style sheets (e.g. CSS (Ryerson University & Canvas.net, 2018)),
- specific content management systems (e.g. WordPress (Dolson, 2015)),
- specific operating systems (e.g. Android App Development (Iwashima, 2018),
- specific tools (e.g. InDesign (Brady, 2018), etc.

Identified courses usually lasted a shorter period of time, while the reviewed training lasted for a longer period of time. The identified training offered wider content and in most cases included both a detailed theoretical background of web accessibility guidelines and technical knowledge of implementation and developing based on web accessibility guidelines. The most known and established certification on the web accessibility domain in USA is IAAP Certification (IAAP, 2018) that offered two levels of certification: a professional level credential and technical level credentials. The certification is prepared to educate two types of web accessibility specialists. The first certification is IAAP Certified Professional in Accessibility Core Competencies (CPACC) and the second one is AAP Web Accessibility Specialist (WAS).

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When the question of web accessibility training is considered, it should be noted that such tools and guidelines exist and are available. However, a small number of people use them, which is why large percentages of websites are inaccessible to people with disabilities. Such tools and guidelines are addressed primarily to web designers and webmasters who can make their website. According to different projects, the webmasters do not use the various tools and guidelines.

Existing training regarding digital accessibility related topics tend to focus exclusively on compliance with the law, weather it be WCAG standard or section 508. This situation is based solely on the driving force behind the initial push into the subject of accessible content. Their purpose is to train QA specialists capable of providing low effort solutions, yet still within the boundaries of the law. What those existing training lack is much more abstracted ways of creative approach and empathy-driven testing. Web design is a very competitive field of work, and its driving force is creativity that isn't often compatible with accessibility standards. Esthetics of the daring design should be matched by the skillful tester that is both capable to suggest new solutions and judge existing structures. As it is now, there is a substantial gap in what can and should be a part of the Digital Accessibility Assurance training.

c. Best practices

The effects of increasing awareness about web accessibility in Slovenia, are already seen by a rise in development and design of accessible websites. Analysis of some websites that present best practices of web accessibility was made. It was found that all reviewed websites from the public and private sector followed the guidelines of WCAG 2.0 for website design and development. Majority of websites included the most common used adjustments for web content presentation defined by WCAG 2.0, for example: option to increase and decrease the font size, option to choose a different font type, not using moving images (GIFs), images are provided with descriptions, use the descriptive names of the links and videos are mostly equipped with subtitles. Most of the reviewed websites are also optimized for use by different types of devices (computers, tablets, mobile phones), various web browsers and operating system. Two websites only mentioned compliance with WCAG 2.0 explicitly (e.g. Shell, 2018; UNHCR, 2018), one website (Slovenski etnografski muzej, 2018) includes the description what was changed that the compliance with WCAG 2.0 was improved, while others include description of the considered guidelines (Zavod za zdravstveno zavarovanje, 2009; Republika Slovenija Računsko sodišče, 2018; GSK, 2018; Mestna občina Ljubljana, 2018) and use web technologies (Mestna občina Ljubljana, 2018; Republika Slovenija Računsko sodišče, 2018). Surprisingly, two websites (NAKVIS, 2018; LIDL SLovenija, 2016) have the A3C certificate for web accessibility that was granted together by the Union of the Blind and Partially Sighted of Slovenia (Zveza društev slepih in slabovidnih, 2018) and the Institute for Good Content (Institute for Good Content, 2018). Therefore, both websites mentioned above can be defined and treated as best practices for web accessibility.

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In Poland the law on „National Interoperability Framework, minimum requirements for public registers and information exchange in electronic form and minimum requirements for ICT systems" (Dz. U. 2012 poz. 526) is in force since May 2012, however there is still a lot to do regarding web accessibility. According to this regulation, all websites of public entities, which were made and put into service after 30 May 2012, should be adapted to the needs of people with disabilities. At the same time, as stated the Regulation, all publishers of websites of entities performing public tasks were obliged to adapt their websites to the accessibility requirements within 3 years from the date of entry into force. The Polish Supreme Audit Office (NIK) which in 2016 had controlled 23 government websites stated that only two of them are fully adapted. This two websites are Ministry of Health www.gov.pl/web/zdrowie and State Fund for the Rehabilitation of the Disabled www.pfron.org.pl. In the remaining 21 websites, it found significant errors, but in three cases the sites were assessed negatively. According to the NIK, the irregularities found on these three pages were so serious that they could significantly impede or even prevent the use of posted content. NIK additionally draws attention to two circumstances, accompanying the question of adapting websites to the needs of people with disabilities: 1) The manner of presenting information on the websites of the offices is important for their reception by disabled users, but not only. It is worth remembering that this problem equally applies to groups of people without disability, but who have, for example, vision problems, older people, poor readers, or those who do not speak the language of content publisher well. The number of these groups in the next years will probably increase. 2) Adjusting websites to the needs of people with disabilities is not a one-time job, but a process that should be carried out continuously - along with the development and running of the website.

Increasing awareness about web accessibility is also noticeable in business sector and non-governmental sector. The Widzialni Foundation www.widzialni.org which deals with preventing digital and social exclusion is the initiator of the national certification program for accessible websites. Among the good practices - in the category Best of the best there are:

a. www.zut.edu.pl - West Pomeranian University of Technology Szczecin
b. https://lka.lodzkie.pl/ - Łódź agglomeration railway
c. www.sztuka24h.edu.pl/ - Art portal
d. www.subregioncentralny.pl/ - Association of Municipalities and Poviats of the Central Subregion of the Silesian Voivodeship.
e. www.symulatory.net.pl/ - Railway simulator

Best practices in regard to human-based evaluation of digital accessibility emerge from the need to simulate selected disabilities in order to identify the problems or close the gaps that people with disabilities face on daily basis. These tools weren't necessarily created for the purpose of evaluation, but can certainly serve in such a way. A good example among many would be free online Color Blindness Simulator Coblis, or mobile app Color Blind Pal with plethora of functionalities aiding with color vision deficiency (such as naming colors thanks

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to the camera, selective color highlight, or simulating various forms of color blindness). There are also widely available online tools that can downgrade the complexity of sentences, that are also proposing changes to the input text, aiming to simplify the text, making it more easily understandable. These tools however are often language dependent by the nature of subject matter and are therefore restrictive in their applications.

Another aspect of evaluation of digital accessibility is based on automated testing. It often comes in form of online tools or programs that can check certain parameters of the website based on its code, and then provide the output in form of the grade related to standard compliance offered by the webpage. These tools however are relevant as long as they are themselves correctly coded, and depend heavily on being updated by their creators. What it does in practice for testers using those tools is creating dependency on other evaluators and abdication of one's own expertise on the subject. Market's need for automated testing doesn't have to translate to correctly working tools, especially when they are based on specific versions of the rule of law or guidelines.

8. Conclusion

The internet has become an inevitable part of our everyday lives, and it is highly integrated in our working and home environment. This has created opportunities for the majority, but a huge obstacle for people with disabilities, who cannot properly access all parts of the web (e.g. Brophy & Craven, 2007; European Parliament, 2014; European Commission, 2015). Digital accessibility has therefore become necessary. Accordingly, the WCAG standard was developed and European legislation, Directive (EU) 2016/2102 (which is about making websites and mobile apps of public sector bodies more accessible) was passed in 2016. This means that the websites and mobile apps of public sector will need to be accessible to all by the year 2020. The question is, how do we accomplish that?

The conducted analysis of digital accessibility skills related to creating web content, web development/programming, web design, evaluation and implementation of digital accessibility (e.g. Conti, 2016; Mobile Accessibility, 2018; WAI, 2018; WAI-ARIA, 2018, WCAG, 2018; W3C, 2018) highlights the skills key stakeholders should have in order to make websites accessible. However, the analysis of the current state of the digital accessibility field in the world (e.g. Bennet, 2014; Central Washington University, 2018; Glassdoor, 2018; Media Access Australia, 2018; Mestna občina Ljubljana, 2018; Shell, 2018) indicates a flaw in translating the WCAG digital accessibility standard into practice in Europe. Job vacancies and training related to digital accessibility are mainly available in the USA, Canada and Australia. On the other hand, there is a need for qualified digital accessibility professionals in Europe, and therefore, the need for certified training in order to empower the multitudes of employees working in web related fields with necessary digital accessibility knowledge and skills.

In order to meet the specifications of the European legislation, Directive (EU) 2016/2102, developing internationally recognized and certified digital accessibility training in Europe is a must. The project aiming to develop such training will contribute to better access of training and qualifications for all, through making all

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material free to download from a web portal. Furthermore, this kind of project will have an impact on social inclusion of people with disabilities by promoting and encouraging learning about accessible websites and applications. Additionally, it will strengthen the professional development of trainers and teachers. The project will improve the quality of training (initial education and continuous development), the quality of teachers, trainers and other professionals in the sector, and it will make courses more relevant to the labor market.

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