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Accessible Content Generation an Integral Part of Accessible Web Design

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Abstract

Abstract

The importance of accessible Web design significantly rose within the last years. This is also reflected in a growing set of legal regulations that demand for accessible Web design. Unfortunately these regulations usually consider technical accessibility only, the complexity of the language used plays a minor role. Thus a huge group of people cannot make use of the content presented on Web pages. This paper discusses in detail the important interaction of accessible Web design and Easy-to-Read to generate accessible content and shows which phases of the design process demand for intensive user involvement.

Keywords: Accessible Web Design; Easy-to-Read; Accessible Content Generation; User Ivolvement

1. Introduction

Over the last decade a serious technological and social change has taken place and Information and Communication Technology (ICT) has become an essential part of our daily life. The information age and the digital society we are living in, offer great possibilities also for people with disabilities. Making ICT accessible increases the potential to enable people with disabilities to take part in almost any area of the daily life. New media and the Internet play a significant and increasing role in the everyday life of the whole population. Especially people with disabilities use the Internet even more than people without disabilities [1]. Accessible Web design is therefore essential to support people with disabilities to enable them to make use of the Internet (with or without Assistive Technologies) independently and without additional help.

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Several rules and guidelines like the guidelines of World Wide Web Consortium's (W3C) Web Accessibility Initiative (WAI) [2] for creating accessible Web pages have been developed. In parallel the compliance with these guidelines has been embodied in the legislation of many countries to support better access for people with disabilities. All information and all functionalities provided on a Web page should be accessible and cope with different handling and presentation options that suit a variety of personal needs and preferences, devices and situations of use.

During the development of accessible Web pages the focus usually is on the conformance to technical criterions like WCAG 2.0 [2] from W3C but often lack of involving people and supporting accessible content. In WCAG 2.0 understanding is a success criterion and Easy-to-Read (E2R) [3, 4] is listed to be always effective, but is not required for conformance. Furthermore user involvement is essential during design and development to implement solutions that properly address the user's needs and requirements [5].

In this paper the accessible Web design is taken as an existing prerequisite. The main focus of the paper is on the user involvement and on the accessible content generation that is essential to implement Web pages that follow the design for all idea and offer information and services to the widest user group available [6]. Of course requirements for people with cognitive disabilities are taken into account but the target group for accessible content generation is much broader and includes also elderly people, migrants, people with severe social problems, people with restricted education or people with other disabilities like hearing disabilities or deaf people.

The approach presented in this paper discusses accessible Web design and user involvement from a wider view that includes the following process steps:

- Design and requirement analysis
- Accessible Web design
- Accessible content generation / Easy-to-Read
- Accessibility support during operation

As user involvement is essential the participation of users in all development stages is understood to be obvious. Naturally, there are tasks that require extensive user involvement. These tasks are described in detail in chapter 3.

2. State of the Art Regarding Accessible Content in Accessible Web Design

Along with a world-wide digitization a radical societal change is to be revealed from whom only parts of the society benefit. R&D in the field of accessible Web design considers a broad field of disabilities including especially blind and partially sighted people, and people with mobility impairments. Apart from these groups a large number of human beings benefit from accessible content that is easy to read and easy to understand. International studies show that in most countries 25% and more of the adult population does not reach an adequate literacy to participate fully in society [4, 7].

Many people with cognitive disabilities have a permanent need for accessible content [4] and clearly structured navigations in ICT application. They are hardly considered during the on-going research for inclusive Web design [8].

Cognitive disability in this paper refers to disabilities arising from cognitive impairments, developmental retardation, and understanding - the ability to comprehend what you see and hear. People with these impairments may have troubles learning new things, making generalizations from one situation to another, or expressing themselves through spoken or written language.

Besides from people with cognitive disabilities the following secondary groups demand for accessible content: pre-lingual deaf people, deaf blind persons, persons with aphasia, persons with dementia and some other age-related cognitive disabilities, recent immigrants deriving from countries using another language, poor readers, and children [4].

14,5% of the German working population are functional illiterate. Functional illiteracy "is used when people can read or write single sentences, but not continuous text - even if it is brief. Due to their limited written language skills, people affected cannot properly deal with everyday requirements of life in society. Moreover another 25% of the working-age population is affected by poor writing skills [7]. It is to be assumed that apart from Germany the results of the leo-study [7] can be transferred to various industrialized countries which overall means a huge group of human beings benefiting from accessible content.

WCAG 2.0 [2] partially refers to the needs of people with cognitive disabilities as presented below: Guideline 2.2 tells to allow users to control time limits on their reading or interaction as far as possible. People with cognitive disabilities benefit from this success criterion for many need more time to follow and understand the content presented.

Guideline 2.4 facilitates the ability of users to orient themselves and to move within the content by using i.e. a hierarchical structure, a table of content, a logical sequence an the usage of paragraphs for the information presented, and a division of documents, especially long ones, into hierarchical subsections with clear and informative titles. People with cognitive disabilities benefit from a clear structure.

Principle 3 says that content and controls must be understandable. It tells the content developer to use a vocabulary that is likely to be familiar to intended readers including the avoidance of professional jargon or terms with a specialized meaning. "It may also be helpful to review the document for plain language" and tells to use the "simplest sentence forms consistent with the purpose of the content [2]. Principle 3 also informs to predominantly use the active voice, to name and label consistently, to thoroughly explain instructions and required actions as well as to provide summaries, examples, illustrations, and symbolic languages.

The latter criteria of principle 3 are essential for people with cognitive disabilities. Unfortunately they are benchmarks for level 3 of guideline 3.1 which lead to the problematic situation to be hardly considered when presenting accessible Web design although a huge group of human beings would benefit [7].

Moreover a lack of scientific research for Easy-to-Read guidelines can be unveiled. E2R guidelines typically present how to conduct accessible information. Previous guidelines predominantly base on heuristic experiences, often developed by institutions supporting people with cognitive difficulties. As far as it is known due to a worldwide investigation no scientific research on this specific topic existed till the study EasyWeb [3] was carried out. Hardly any guideline tells how to achieve E2R on the Internet [9, 10].

Generally, an implementation of Easy-to-Read on the Internet is very underdeveloped in Europe. Only a few provide E2R information on the World Wide Web and even less present E2R text in a way according to the W3C WAI guidelines [11]. It seems as if Web page and content developers have too little knowledge on writing E2R information and the other side, those deriving from the social sector and those calling for E2R information on the internet lack of methods to provide accessible information as an integral part of accessible Web design.

3. Methodological Approach to Support User Involvement and Easy-to-Read Integration

To control the computer people with disabilities use Assistive Technologies (AT) to facilitate input or enhance output and to bridge the gap between the standard user interface and the users' abilities. They select the adequate AT according to their abilities, needs and preferences. Due to AT it is not exclusively a question of the users abilities or limitations, it is more and more a question of the design of tools and systems to support abilities and provide suitable interfaces to products, systems and services [12].

The following paper discusses a methodological approach to implement Web pages that support the abilities of the users and to enable people to really make use of the content presented on a Web page. Thus it is very important to consider the requirements of people with disabilities in every step of the development process to improve the accessibility of Web sites [13].
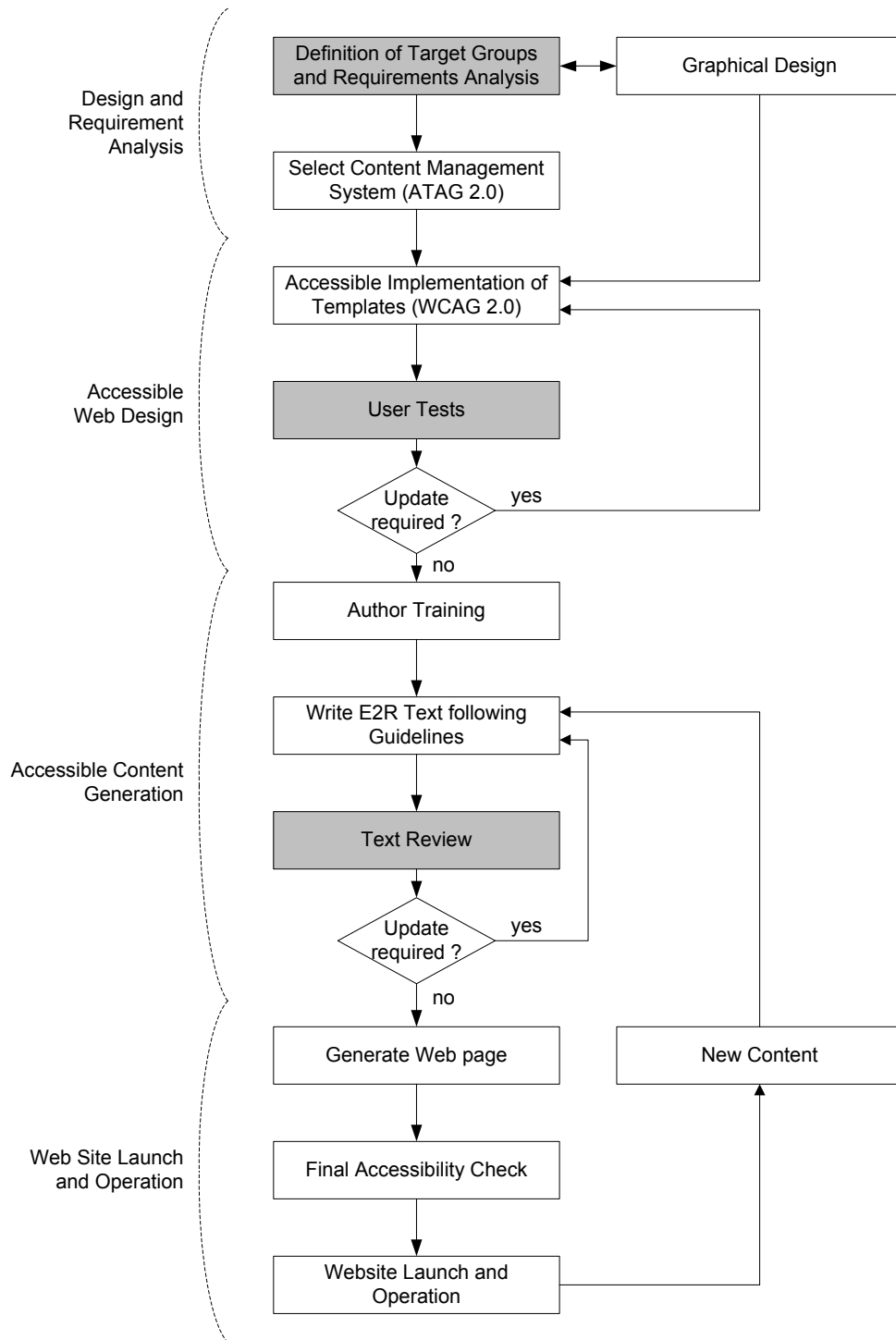
Fig. 1: Workflow to implement accessible Web pages taking into consideration comprehensive user involvement and accessible content

The workflow to develop a Web page that comprehensively supports accessibility can be split into four major steps:

1. Design and Requirement Analysis
2. Accessible Web design
3. Accessible Content Generation
4. Web Site Launch and Operation

Fig. 1 gives an overview on the workflow that will be discussed in detail in the following sub-chapters. Process-steps that require extensive user involvement are highlighted with a gray background.

3.1. Design and Requirement Analysis

The success and the competitiveness of Web pages depend on the users perceptions and if the Web site is satisfying for the user. This is not only a question of the content, but also a question of adequate design and the consideration of the user's requirements. Therefore it is very important to identify the target group(s) of a Web page as well as their requirements already at the beginning of the design and development process. Such requirements can be technical requirements, but also requirements regarding presentation, handling or textual level of the content. These requirements can influence the graphical design of a Web page, because the design has to match the user's requirements. Therefore it is necessary to have an interaction between requirement analysis and graphical design to develop a design that properly reflects the expectations and requirements of the future users. Consequently, potential users should already be included in the design and requirement analysis.

After defining the target group and their requirements, a proper Content Management System (CMS) that supports the generation of accessible Web pages must be selected. The World Wide Web Consortium (W3C) has developed the Authoring Tool Accessibility Guidelines (ATAG) [14]. ATAG is a set of guidelines that define how authoring tools like content management systems must be developed to produce Web content that is accessible and conforms to accessible Web design guidelines [2]. ATAG addresses the needs of two user groups, the authors of Web content as well as end-users. To fully support an accessible Web design process, the CMS selected should fulfill ATAG.

3.2. Accessible Web Design

Adjacent to design and requirement analysis the development of Accessible Web pages can start. Accessible Web design is the proper use of standard techniques to implement Web pages in a way so that people with disabilities can use them, with or without AT and independently without additional help of someone else. The W3C has developed the Web Content Accessibility Guidelines (WCAG) [2] that consists of a set of rules and guidelines for creating accessible web pages. These guidelines show how to consider accessibility in Web pages regarding a wide range of disabilities like physical, visual, auditory, speech, language, cognitive and neurological disabilities. Following these guidelines all information and all functionality provided on a Web page are accessible and cope with different handling and presentation options that suit a variety of devices, situations of use and personal needs and preferences.

However, following WCAG 2.0 may not be enough. There are usability lacks concerning some people with disabilities. E.g. people with visual impairment may have problems with font styles, colors or the general layout of a Web site. People with physical disabilities detect usability lacks concerning tasks with a lot of steps or a wide range of movements. Usability in general is essential for accessible Web design [15]. Simply following technical accessibility guidelines like WCAG 2.0 does not automatically mean that Web pages are usable and therefore easy to use, simple to learn, or supports efficient job performance, too [16]. Ideally accessibility and usability is an integral part of the Web site's user centered design process [15]. To gain significant improvements in accessibility and usability the development phase must be followed by

accessibility and usability tests where among others at least one person of each target group must be involved [13].

3.3. Accessible Content Generation

Some parts of accessible Web pages cannot be implemented in the templates itself, they must be realized by the authors, e.g. to add alternative text to each picture included in the content which conveys information or to write easy to read and easy to understand text. So Authors must be trained to use the selected CMS in an accessible way.

Easy-to-read (E2R) is a method to write text in a form which is easy to read and easy to understand. This method includes user involvement as a substantial part and is described in the European standards for making information easy to read and easy to understand [9] as well as in the document „Do not write for us without us" [17]. Both documents have been developed in the framework of the EU-project „Pathways to adult education for people with intellectual disabilities". The E2R-method includes guidelines to gain accessible content which is easy to read and easy to understand.

The most important part of user involvement in the E2R-method is the text review by the target group. Members of the target group are the real experts of easy-to-read. Only they can say if the text is understandable or not. This will improve the quality of the understandability of content significantly. A group of 3 to 5 persons of the target group should be involved in this text review. One person without a cognitive disability assists the reviewers. [17, 8]

The E2R-method can be used for creating accessible content of Web pages. To ensure that the Web site is accessible for people with cognitive disabilities more requirements must be satisfied. These requirements are described in the section "Challenges for the Generation of Accessible Content".

3.4. Web Site Launch and Operation

After the generation of accessible content, Web pages and thus the whole Web site can be generated. A final accessibility check operated by accessibility experts can detect remaining accessibility problems caused by authors during the content generation. If a new page or a new article hast to be added the process of accessible content generation is initialized again.

4. Challenges for the Generation of Accessible Content

Accessible Internet needs both technical accessibility and accessible content. A basic accessibility can be achieved by following the WCAG 2.0 [2]. WCAGs however are insufficient for people with cognitive disabilities and the secondary groups of E2R as accessibility of content asks for a strong usability aspect. Consequently, accessible Web design and usability are crucial in the context of E2R Web applications and latter requires a comprehensive expertise in both technical accessibility and easy-to-read.

Usability is strongly considered during the realization of E2R on the Internet. Usability research tells us i.e. to use short sentences and to use well elaborated text. E2R guidelines show how to do this and how to improve readability and understandability so that either people with cognitive disabilities are able to understand the content. Usability enhances the ability to achieve the required content. E2R helps to understand the offered content [3].

In the following sub-chapters some essential challenges are described.

4.1. Navigation

Guideline 2.4 of the WCAG 2.0 [2] tells to provide facilities that help users to orient and navigate through the Web page. People asking for Easy-to-Read desperately depend on a clear and consistent navigation, using hierarchical structures. It structures a Web site, supports orientation, and enhances the usability. A clear and consistent navigation consists of short and accurate terms from the everyday language of the target group. The navigation can be amended by using symbols which scale up or down when zooming in or out. A clear visual separation of the navigation bar and the content supports betters orientation and navigation.

4.2. Search function

A search function at a Web page supports the location of single words or whole articles. E2R on the Internet asks for a large search field, ideally prominently placed, and located always at the same position.

Useful search results depend on the query, the mechanism or algorithm of the search engine, and the presentation of the search results [18]. A search function is crucial for people with limited knowledge in written language, yet they hardly get the results they target for they often misspell words and type text into the search box as it is spoken. They also forget or change single letters of a term, or add a letter while writing it. So, people with limited writing language skills benefit from a word completion which is flexible enough to provide first the right spelling and second adequate terms for the search despite of spelling mistakes.

Bergmann and Erle [18] propose the following approach for useful search functions:
1. A compensation mechanism consisting of a combination of different algorithms finds syntactic similar words. The similarity is evaluated through the word length, the number of same letters in the term, and the same first letter.
2. The search engine provides a number of results in a word cloud whereas the most probable search result is provided in larger font than further terms. So, the user will more likely receive useful results.

4.3. Login

A symbol-supported communication is characterized by symbols clarifying textual information redundantly. A symbol-supported login process helps people having problems with written language to better follow given instructions. Therefore the consistent use of one symbol for the same term throughout the whole Web site is crucial.

4.4. Easy-to-Read Content

E2R information means among more a larger font than usually presented on the Internet. In accordance with a technical accessibility the font should be scalable and under consideration of people with cognitive disabilities and secondary E2R target groups the font should be medium-sized from the start [3]. Many Web pages enable a font enlargement by means of the browser. People with cognitive disabilities nevertheless have limited knowledge about such help facilities and hardly learn to use them. Following this a magnification should be offered directly and prominently placed at the Web page. The magnification should ideally provide more than three levels of changing the font size.

E2R text also means a clearly readable font. According to a technical accessibility E2R content on the Internet also uses sans serif font. Pictures or patterns as a background should not be used in order to make the text well-readable and to avoid confusion on the side of the user.

E2R usually requires sentences fitting in one line. If a phrase is longer, one will do line breaks where a human being would pause during the pronunciation of the sentence. On the internet the end of a line sometimes

reach out of the current view, depending on the screen, depending on individual system settings and on the adjusted font size. Therefore predetermined breaks have to be defined with respect to a clear arrangement of information and non-text elements.

On the one hand the internet subsists of hyperlinks, on the other hand E2R usually avoids cross references. A combination with E2R makes sense i.e. concerning dictionaries defining terms [3].

5. Conclusion

Web pages that enable people to really make use of the content presented, ask for an ongoing combination of accessible Web design and Easy-to-Read. Both disciplines need to be considered from the very beginning of the workflow. The Competence Network KI-I has a long-lasting experience in accessible Web design (i.e. accessibility consulting for websites like www.linz.at [19] or HELP.gv.at [20] the information and service platform of the Austrian Federal Chancellery, both awarded with a Biene Award [21] and www.gleichgestellt.at [22] a comprehensive information platform for people with disabilities). Moreover the KI-I creates Easy-to-Read print materials (i.e. the Upper Austrian Law for Equal Opportunities of People with Disabilities [23]). The know-how in both disciplines made it easily possible to combine them in order to create accessible Web pages like www.proqualis.at [24] that confirm that the described workflow is feasible and realizable in reality.

The consideration of accessibility and usability as well as text complexity significantly reduces the complexity of the Web and leads to user-friendlier Web sites that are essential for customer satisfaction, loyalty, quality and success [16]. All users benefit from such Web sites, but some user groups rely on accessible interfaces that are filled with accessible content, not only people with cognitive disabilities but also migrants, people with severe social problems, people with restricted education or people with other disabilities like hearing disabilities or deaf people. The forthcoming process of demographic ageing and the wide spreading of the Internet furthermore amplify the number of users that request information and services that are easily understandable and easily operable. Therefore accessible content generation can be seen as an integral part of accessible Web design. Nowadays Web designers and developers are often introduced to accessibility because of the growing set of legal regulations. In such cases the focus is often limited to fulfill standards and guidelines. But they often lack in detailed knowledge and understanding of the target groups requirements, thus technical aspects overbalance human interaction aspects. In combination with a lack of comprehensive user involvement this often leads to Web pages that are accessible but not satisfying for their target users. It is notable that there is a growing body of national laws and policies that address accessibility of Information and Communications Technology (ICT), including the Internet. However this is mostly restricted to technical aspects based on WCAG 2.0 and therefore excludes users that have requirements regarding the text complexity. But there are first legal regulations like the German BITV 2.0 [16] that reflects the importance of both Web accessibility and Easy-to-Read. Such legislations will provide and aggravate the need to support accessibility and Easy-to-Read as integral parts in Web design.

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