

# SEMI-AUTOMATED TEST ENVIRONMENT FOR WEB CONTENT ACCESSIBILITY BASED ON WCAG 2.0

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**Abstract:** Internet is becoming an important part of the lives of people with disabilities. Currently the Web Content Accessibility Guidelines 2.0 (WCAG 2.0) has been published as a working draft. To reach the goal of accessible Web content for all people, including people with disabilities, the Web content has to satisfy the success criteria. We will present an approach for a semi-automated web based evaluation tool which helps to fulfil the WCAG 2.0 guidelines. The tool can be used by developers to evaluate how good Web content fulfils the success criteria. It also allows estimation of effort to change an existing Web content to fulfil the WCAG 2.0 guidelines.

## 1 INTRODUCTION

For a wide range of people with disabilities well accessible Web content can help to make their lives comfortable. A study in Germany shows that around 80 percent of disabled people have simple or good knowledge of using the Internet (Hammer, 2006). On other side a lot of Web content is only marginally accessible and a study shows that only three percent of the web pages have a good accessibility ("Barrierefreiheit," 2006).

As part of the Web Accessibility Initiative (WAI), the W3C has developed Web Content Accessibility Guidelines. After May 2007 the working draft of WCAG 2.0 became available. This paper will present a semi-automated web based tool that helps to check how good the WCAG 2.0 guidelines and success criteria have been fulfilled by a given web content. The tool can be used by designer and developer of Web content to improve their work. Web content in this context includes text, images, sounds, video and other. The tool can also be used to estimate the effort to change an existing Web content with the goal to fulfil the WCAG 2.0 success criteria. Some international and national laws and directives ask for Web content to be

accessible to a wide range of people with disabilities.

## 2 DISABILITY

To describe what a disability means the World Health Organisations (WHO) International Classification of Functioning, Disability and Health (ICF) can be used. The ICF is a framework for measuring health and disability at individual and population level and lists 9 broad domains of functioning which can be affected ("International Classification," 2007). Disability includes blindness, deafness, low vision, hearing loss, cognitive limitations, limited movement and other.

### 2.1 Current Situation in Germany

In Germany the Statistisches Bundesamt provides an official statistics about the situation of disabled persons every two years. These statistics only include disabled persons with a degree of disability at least 50. At the end of 2005, around 6.7 million people in Germany are more than 50 percent disabled. These are 8.2 percent of Germany's

population (“6,7 Millionen schwerbehinderte Menschen,” 2006). The number of severely disabled persons has increased. The reason is the advanced medicine. So today people can live with diseases, which were deadly a few years before.

## 2.2 Types of Handicaps

From accessibility Web content everybody has a benefit. Of course disabled persons have the major benefit. They meet on more barriers than non-disabled persons.

There are different types of handicaps. In a study from the German Federal Ministry of Family, Seniors, Women’s and Adolescence types of handicaps are analysed. The impairment of the function of the internal organ is the frequently encountered type of handicap.

From different literature and statistics we can classify four main types of handicaps (“Gender Datenreport,” 2005): Body-disability (67 %), Cognitive disability (8%), Visual impairment, blindness/colour-ametropia (5%) and Aural-damage (4%). The values in brackets show the percentages of this group opposite to all collected data of severely disabled persons. The group of body-disability is the largest group. The others are all about the same.

It is an established fact that 83.5 % of a disability is caused by diseases and only 4.7 % of a disability is due to inheritance. 74 percent of severely disabled persons are 55 years or older.

## 3 INTERNATIONAL GUIDELINES

Guidelines and laws for accessibility exist on international and national level. In March 2007, The United Nations has published the Convention on the Rights of Persons with Disabilities.

In the area of Web Content the WAI as a part of the W3C has developed the Web Content Accessibility Guidelines. These guidelines explain how to make Web content accessible to people with disabilities. The guidelines have met a breadth of international acceptance and should be used by all Web content developers. Following the guidelines makes the Web content more accessible for all users if whether they are disabled or not.

Under the leadership of the WAI three series of accessibility guidelines have been developed. The Authoring Tool Accessibility Guidelines (ATAG)

defines how authoring tools should help developers produce accessibility Web content. The User Agent Accessibility Guidelines (UAAG) is primarily for developers of user agents like Web browser, media player or assistive technologies. Core of the WCAG is to explain Web content’s good accessibility.

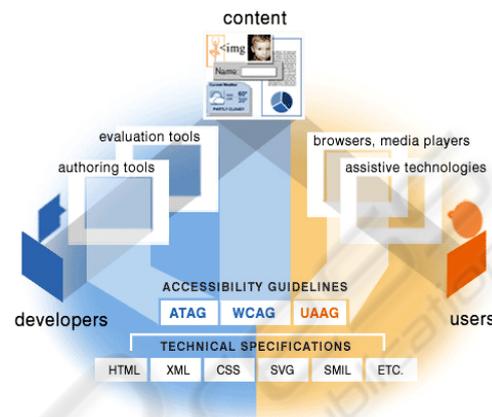


Figure 1: WAI Guidelines and Techniques (“WAI Guidelines,”2006).

Figure 1 shows that the accessibility of Web content is not only the function of a web developer. Also the developers of authoring and evaluation tools as well as developer of browsers, media players and assistive technologies have to account for compliance with regulations.

Based on the Last Call Working Draft from 27 April 2006 the WCAG 2.0 now includes many new aspects. Hundreds of comments have been given by reviewers and currently it is in the state of a Working Draft. This Working Draft (May 17, 2007) is the basis for our test tool. The four major accessibility principles are *perceivable*, *operable*, *understandable* and *robust* as shown in figure 2. These principles are subdivided in 12 guidelines and the guidelines are further subdivided in 56 success criteria. The 56 success criteria are organized into three levels. Single A conformance means, that all these criteria have to be fulfilled in order that the Web content satisfies level A. To satisfy conformance level AA the Web content must fulfil all single A and all double A criteria. Level AAA is the highest conformance level and all 56 success criteria on the three levels have to be satisfied. The guideline describes that a level does not mean that some criteria are more important than other. With the goal of a triple A conformance this is right but indirectly a weighting is given. On the other side a AAA conformance does not guarantee that all people can access the Web content. For example not

all accessibility issues of people with cognitive disability can be addressed by the guideline.

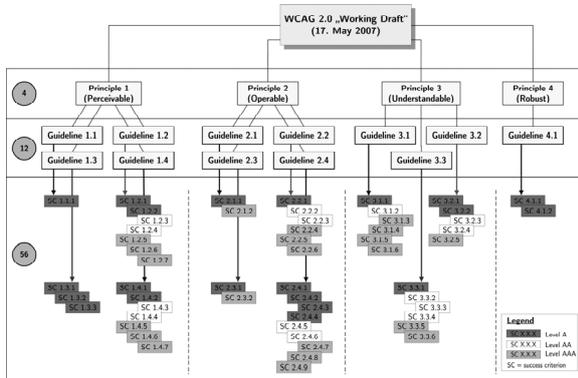


Figure 2: Overview WCAG principles and success criteria.

Based on the Barrierefreie Informationstechnik-Verordnung (BITV) all public authorities have to realize Web content with a high accessibility (“Verordnung zur Schaffung,” 2002). In the next chapter we will present an approach for a semi-automated web based tool which will help to evaluate Web content under the view of the WCAG 2.0.

## 4 REALISATION

When WCAG 2.0 has a final state, much Web content has to be reviewed and adapted. Our web based SET tool should give developer and designer semi-automated support. SET tool means free translated self evaluation and test tool.

WCAG 2.0 describes 56 criteria for creating accessible Web content. For some of these criteria automated test tools exist and can be used. But also success criteria exist which are currently not automatically testable. So our concept was to develop a tool for a semi-automated web based test of Web content. The tool should give descriptions for the different criteria and reference notes on how to test these criteria. If automated test tools exist, they can be used. A description of which test tools exist will be given by the SET tool. The descriptions and overviews are for every user available. Authenticated user additionally can use the SET tool to evaluate Web content.

They can evaluate the success criteria step-by-step using the description, references, examples or automated tools. A quick navigation helps to see which criteria have been estimated and which not. If a criterion can not be evaluated it can be marked as

non-applicable. A quick overview like a traffic light shows at every time which criteria are successfully evaluated, which criteria are not fulfilled, which criteria are non-applicable and which criteria are not tested now.

If all 56 success criteria are tested the user can produce a report. The report offers generated diagrams and graphs. These diagrams and graphs show the result and if conformance level A, level AA or level AAA is reached. They want also show which success criteria are not fulfilled. The non-applicable success criteria will be evaluated like fulfilled success criteria. In this context non-applicable criteria means that special technologies have not been used. For example if no images in a Web content are used the question after all attributes can not usefully be answered.

## 5 EXAMPLES

In this chapter we will present examples of Web content of public authorities evaluated by using the SET tool. The first screenshot in figure 6 presents a radar plot which shows the results of the SET tool based evaluation. That a lot of criteria can be visualized at one view is the major benefit of the radar plot.

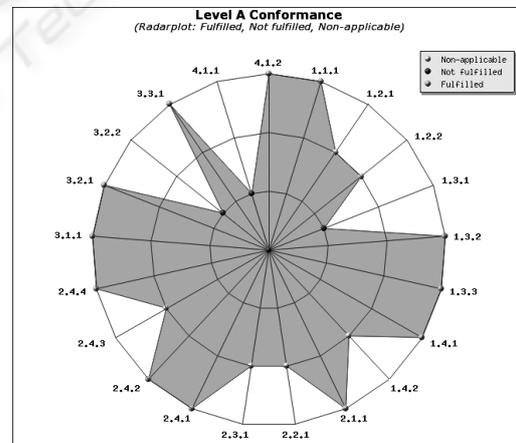


Figure 3: Radar plot of level A conformance.

Because analysis is anonymous we can only explain that the owner of the Web content is a big German health insurance company.

Figure 3 shows that 12 of the 21 level A criteria are successfully visualized by the outer circle. The inner circle shows that 3 criteria are not fulfilled and the middle circle shows the 6 non-applicable criteria. To reach the Conformance level A the developers

have to change the content. The SET tool shows which success criteria fail and it has some support how to change the content. The radar plot in figure 4 shows the conformance level AAA result.

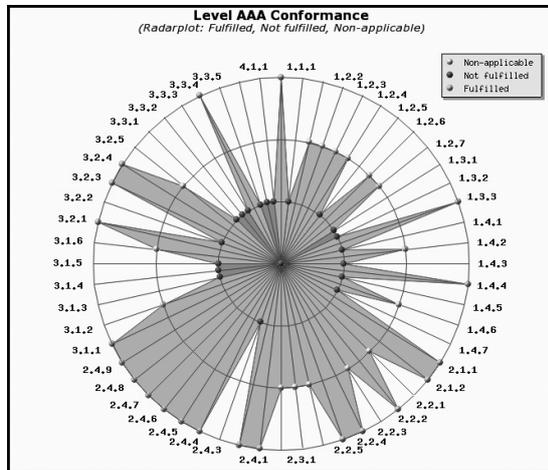


Figure 4: Radar plot of level AAA conformance.

Figure 5 shows that 19 success criteria from 56 are not fulfilled and so of course the conformance level AAA is not reached. On the other side only 21 success criteria have been fulfilled and so that are only around 50 percent. We can say that this Web content is not usable for people with disabilities. Also we can identify that a large effort has to be done to make the Web content conform to level AAA.

For a fast overview across all three conformance levels a bar chart is available. With one view the user can see how well the analysed Web content fulfils the different conformance levels. The graph in figure 5 also gives a feeling how much effort has to be done to satisfy a conformance level.

## 6 CONCLUSIONS

Based on international and national laws and guidelines Web content with a good accessibility becomes more and more important. In this paper we have presented an approach for a semi automated web based test environment. This test environment should help developer and designer to make their Web content more accessible. The development of the tool has been based on the WCAG 2.0 guideline. Using the tool gives an answer to the question if one of the conformance levels has been reached.

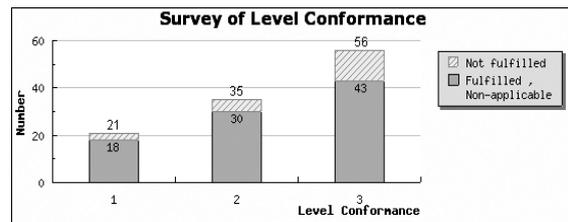


Figure 5: Bar chart over all conformance level.

Additionally, the developer gets a support by changing Web content with the goal to satisfy a special conformance level. He also gets information on how much effort is required for the change.

The presented tool is helpful not only during the development of new Web content but is also useful for calculating the effort to change existing Web content under the view of a high accessibility.

## REFERENCES

- Verordnung zur Schaffung barrierefreier Informationstechnik nach dem Behindertengleichstellungsgesetz. (2002). Retrieved October 14, 2007, from <http://bundesrecht.juris.de/bitv/index.html>
- Hammer, T. 2006. Surfen ohne Stolperfallen. Retrieved October 15, 2007, from [http://www.zeit.de/2006/18/Gutes\\_Internet](http://www.zeit.de/2006/18/Gutes_Internet)
- International Classification of Functioning, Disability and Health. (2007). Retrieved October 16, 2007, from <http://www.who.int/classifications/icf/site/icftemplate.cfm>
- Barrierefreiheit ist bei den Internetauftritten mittelständischer Betriebe in Deutschland nur unzureichend verwirklicht. (2006). Retrieved October 11 2007 from, [http://www.indeca.de/ximages/25893\\_ind\\_eacpm01.pdf](http://www.indeca.de/ximages/25893_ind_eacpm01.pdf)
- Gender Datenreport - Kommentierter Datenreport zur Gleichstellung von Frauen und Männern in der Bundesrepublik Deutschland /Forschungsbericht. (2005). Retrieved October 2007 12, from <http://www.bmfsfj.de/Publikationen/genderreport/9-Behinderung/9-5-Frauen-und-maenner-mit-behinderung-in-der-amtlichen-statistik/9-5-3-medizinische-dimension-der-behinderung.html>
- 6,7 Millionen schwerbehinderte Menschen in Deutschland. (2006). Retrieved October 18, 2007, from [http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/DE/Presse/pm/2006/07/PD06\\_\\_277\\_\\_227.psml](http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/DE/Presse/pm/2006/07/PD06__277__227.psml)
- WAI Guidelines and Techniques. (2006). Retrieved October 20, 2007, from <http://www.w3.org/WAI/>
- Web Content Accessibility Guidelines 2.0. (2007). Retrieved October 21, 2007, from <http://www.w3.org/TR/WCAG20/>