

Improving the Accessibility of Wikis

A Basic Analytical Framework

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Abstract. During the last years wikis have become important information portals. Nevertheless, research in wiki accessibility is an often neglected topic. This paper takes a basic analytical and systematic step inside this new and complex area, explores the peculiarities, possibilities and limitations of wiki accessibility. Wikis give rise to certain accessibility limitations but also do offer new ways and concepts to improve accessibility. We present basic concepts and extensions to the wiki markup that are to our minds inevitable for improving the accessibility of wikis. It is pointed out, that wiki accessibility is not something totally new but mostly a complex conjunction of yet separated classical discussions. However there are also wiki specific accessibility aspects.

Key words: Accessibility, Wiki editing, Wiki viewing, Wiki markup

1 Introduction

Wikis are a modern technique that enables users to view, create and edit content of websites collaboratively. Page structure, linking and style is achieved by using a simplified markup language. Inspired by Apple's Hyper-Card project, in 1995 Ward Cunningham invented the first wiki ever. It was the famous online encyclopedia Wikipedia that starting in 2001 brought wide attention to the concept of wikis to vast parts of society. Now in 2008 numerous different wiki communities exist world-wide. Wikimatrix (a famous comparison tool for wiki software) lists over 100 different wiki engines. Wikis are also growingly used by companies as easy editable intranets for project coordination and knowledge management. Because of this increased importance and inevitability of wikis in private and professional life, it becomes necessary to make wikis as accessible as possible for the growing number of elderly people ("silver surfers") and other persons with disabilities and special needs so as to avoid a "digital divide". Surprisingly wiki accessibility seems not to be a research topic for the scientific community at all - neither theoretically nor empirically. There are also no accessibility guidelines and criteria lists available for wikis where you can check an actual wiki implementation against, although they are urgently needed (see [1]). And so accessibility is no topic for most wiki developers. They simply do not know what they should do to improve the accessibility of their wiki engine.

Therefore we take in the following a first step inside this new and complex area, explore the peculiarities, possibilities and limitations of wiki accessibility. It is pointed out, that wiki accessibility is not something totally new but rather a conjunction of yet separated classical discussions, an amalgamation of web authoring and viewing (see figure 1). But wiki accessibility is also more than a mere combination of classical discussions: it demands for certain enhancements, opens up new possibilities for accessibility but also imposes certain restrictions.

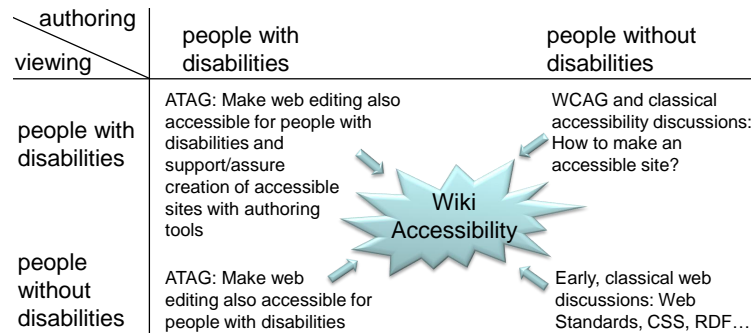


Fig. 1. Wiki accessibility as conjunction of web authoring and viewing accessibility.

2 Related Work

As already stated, there is no theoretical work in the scientific area, which deals with wiki accessibility in general and which systematically explores into this new subject. Well-grounded empirical research is missing either. However one could find some related work in the area of content management systems.

Content management systems (CMS) are closely related to wikis, since they also offer some interface to edit web content directly in web browsers. Yet the spirit behind CMS is different: Page creation and edit is often restricted to a small number of known and appointed authors. The whole page creation and publication process is bound to a standardized workflow, heavily controlled by a fine-grained and role-based access control technique. CMS-pages appear to the public as normal, not editable web pages. In contrast wikis are characterized by an open, democratic or, as critics say, anarchic approach in page editing. In a wiki normally everybody can easily create and edit a page. The wiki spirit is driven by the idea of low restrictions. Everybody should be able to contribute to a community easily, share his knowledge, improve content and formulation and correct mistakes. Thereby individual knowledge gets united incrementally to a collective one. Regarding accessibility of CMS, May explores from a more theoretical and scientific background how to design accessibility practices and ATAG guideline into a content management workflow [2].

O Connor reports from a more practical point of view on an empirical user test on accessibility of CMS [3]. All in all, the tested CMS engines were considered as badly accessible for screen reader users, mostly because of the inaccessibility of browser-based WYSIWYG-editors.

The Wiking CMS calls itself to be fully accessible for screen reader users (mainly conforming to WCAG guidelines). But it is admitted, that this is a subjective statement [4].

A main part of wikis is their markup language. During the last years many different markups developed in the different engines. Regarding wiki authoring accessibility this is a serious problem. Therefore, the WikiCreole Project was started to define a uniform wiki markup that should enable authors to use this markup in different wiki engines [5]. WikiCreole does not want to create a standard or replace existing markups. However, regarding accessibility, it probably would be a great benefit for the community to have one markup standard. So also accessibility related changes in the wiki markup could be easily propagated.

But again: What does it mean to have an accessible CMS or wiki? A systematic exploration into explicit criteria characterizing accessibility is still missing. Therefore we show a first approach for this in the following.

3 Wiki Viewing

As wikis are on the one hand normal web pages we have investigated wikis with respect to the issues addressed by the Web Content Accessibility Guidelines 1.0 (WCAG) [6], German governmental regulations [7] and other best-practices as the German award for accessible websites BIENE [1].

Navigation: As stated in WCAG [6] Guideline 13 “Clear and consistent navigation mechanisms are important to people with cognitive disabilities or blindness, and benefit all users”. So an essential step to better wiki accessibility is the optimization of the page structure by e.g. emitting page content first and all the sidebars last. Hidden h1-headings provide better meta-structuring of the page and ease navigation for screen readers by jumping from heading to heading (e.g. Page content, Search and Navigation Menu, Edit Menu, Login). Hidden navigation links (skip links, back to top / back to main navigation links) are helpful for those screen reader users not using heading navigation. An improved breadcrumbs navigation (“You are here:”) put at an easily to reach place ameliorates orientation and hierarchical navigation within the wiki.

Through the fact that in wikis typically every user can have a personal user account where you can save certain user preferences or an own homepage where you can attach or upload files opens up possibilities for further customization. For example customizable access keys are realizable. The user can attach or upload an access key definition file containing the keyboard shortcuts (e.g. Key ‘E’), the associated action (e.g. ‘Action=Edit’) and short explanations (e.g. ‘Edit Page’) which can appear in the footer of the page as some small cheat-sheet to tell the user which access keys are available on the page. So there would be no

language problems anymore, no collisions with other assistive technologies as built-in access keys often have.

Readability of web pages for blind users can be improved by using more semantic markups like `<code>` instead of `<pre>` and by clearly marking language changes. If visually presented, such tags can also help people with intellectual disabilities to better understand the content. Therefore, the wiki markup should be extended with equivalent phrases. E.g. it is quite straight forward to integrate markings for abbreviations. The explanations for an abbreviation are stored in an own wiki page. So everybody can enhance and/or change a given abbreviation dictionary, create a new specific one for a certain realm and mark these new abbreviations in his newly created web content. Of course, uses and explanations of abbreviations will be linked. The marking of abbreviations (or acronyms) could look like the following:

- `^WAI^` marks the word WAI as an abbreviation and tries to retrieve the explanation from the standard abbreviation definitions page
- `^WAI|OtherPage^` marks the word WAI as an abbreviation and tries to retrieve the explanation from the specified page "Page"
- `^WAI:Web Accessibility Initiative^` marks the word WAI as an abbreviation and uses the given explanation.
- `^WAI|lang=de^(^WAI|Page|lang=de^, ^WAI:Web Accessibility Initiative|lang=de^)` marks the word WAI as a foreign language abbreviation

Markups for quotes and block quotes can be realized in a similar way.

A common problem in wikis is that people often use tables to make some simple wiki page layout (e.g. to position an image floated to the right or an attention box). This often is a problem when accessing a page with a screen reader. By introducing some new extensions (e.g. a plug-in for richer page layout) people have the possibility to do nicely styled alert and attention boxes and page layout without tables but some predefined CSS classes.

Another key aspect of accessibility is providing *adequate presentations for different visual disabilities*, like low vision or color blindness. This mainly requires two functionalities: a zooming function for changing the size and a style switcher for changing the colors of text and images. A style switcher should provide some well defined and evaluated styles (at least black/white for high contrast). Both functions have to be easily findable and reachable. Furthermore, as already mentioned, they should both affect text as well as images on a page. For example an image correction process according to [8] could be applied that produces counterparts of the images adequate for people with different color vision deficiency. So important details would stay visible to them [9, 10].

However it demands further research to answer the question where accessibility should move to - to the server side or to the client side? When using wikis, it is tempting to move a lot accessibility features to the server (image correction, zooming, style-switching, speech-output), however it is not clear whether this makes also sense, is practically feasible (e.g. higher server loads) and really needed (e.g. a server-side zoom allows switching from a two column layout to a one column layout to support efficient working also within high zoom levels).

4 Wiki Authoring

Since wikis are not only simple web pages but also web applications which allow authoring of web content, the Authoring Tool Accessibility Guidelines 1.0 (ATAG) [11] are also of importance. Main goal of the ATAG is to assure that both the authoring tool itself and the web content produced are accessible.

Accessibility of the Authoring Tool: Wikis are normally edited in a simple text input field, where wiki markup for page structuring and style is entered. However, in recent times, WYSIWYG editors (formerly typical for CMS) were introduced to wikis. But as O Connor [3] pointed out, currently most WYSIWYG editors suffer of bad accessibility. So a light-weight wiki markup could be regarded as an accessibility feature. However, for people with intellectual disabilities remembering wiki markup could be a barrier. Simple text editors with a button list for formatting could help here. In general one could distinguish the following basic means to edit a wiki page:

- Plain textbox editors (with markup cheat sheet, e.g. MoinMoin Wiki): well accessible for the blind; problematic for people with intellectual disabilities
- Textbox editors with a formatting bar (e.g. Wikipedia, DokuWiki): accessible for blind and people with intellectual disabilities
- Textbox editors with syntax highlight and auto-completion (see <http://codepress.org/>): accessibility not yet checked; seldom to find in wikis yet.
- A combination of textbox and WYSIWYG editors (e.g. JSP-Wiki’s Wiki-Wizard): accessibility not yet checked
- Plain WYSIWYG editors: only visually driven; accessibility reported as bad.

As already mentioned, there are over 100 different wiki engines on the market and each engine offers its own proprietary wiki markup. As wikis become more and more important with one and the same user contributing to different wiki communities, the high variety of wiki languages itself becomes an accessibility barrier. An interesting approach to solve this is WikiCreole (see section 2). In general wiki markup must be lean, simple and easy to input by keyboard to be considered as accessible:

- “Lean” means that the amount of markup tags should not be too big but at the same time powerful enough to support creation of accessible content.
- “Simple” means that the markup should be easy to remember and “intuitive”, e.g. in Creole “/” is used for indicating italic text formatting.
- “Easy to input” means that people with motoric disabilities should also be able to input markup easily, i.e. double clicking and usage multiple keyboard keys at a time should be avoided.

However some research into wiki markup for tables showed us, that there are also limitations for accessibility: To get a data table fully accessible with respect to WCAG Guideline 5 “Create tables that transform gracefully” [6], the light-weighted markup gets so complicated, that it nearly resembles normal HTML markup. On the one hand accessibility is improved (for screen reader

users) on the other hand usability (doing coding) gets more difficult thus a new accessibility hindrance is created. So for data tables we consider only markups for row and column headers to be useful and realizable.

Creation of Accessible Content: Concerning the second main goal of ATAG “Assure creation of accessible content”, it becomes obvious, that ATAG was designed at a time (1999) where wiki accessibility and wikis in general were no topic at all. It is an open question whether ATAG guidelines fit to the wiki spirit of openness, incremental changes and freedom of regulation, i.e. it is an open question whether to simply enable, actively promote or strictly enforce accessible content creation in wikis:

- Simple Enabling: Users can save also inaccessible pages. In true wiki spirit, it is trusted in that other users will correct this fault in near time. Only coding guidelines and help pages tell the users how to create accessible content.
- Active Promotion: Like a button “Check spelling” above the text input field, there is also a button “Check accessibility” which triggers a page checkup and a resulting accessibility report with errors and hints how to improve output. Changes can be saved out of consideration for accessibility.
- Strict Enforcement: Saving the page triggers an accessibility check. Only if this check is passed changes to the page can be saved.

At the moment we prefer “active promotion” as we think it is not disturbing the freedom of wiki editing but call the authors’ attention to create accessible web pages. We should remember that most web page authors are not at all sensitized to this topic.

5 Wiki Specialties

Wiki accessibility is not only based on the above mentioned “classical” discussions, calls for their merge, reinterpretation and enhancement. Wikis do also offer new potentials for accessibility, come up with new challenges and new constraints at the same time. To make wikis really accessible, it does not suffice to just conform to some guidelines or governmental regulations. Wikis must be made accessible by analyzing, improving and optimizing certain recurring tasks, like the following:

- Reading Recent Changes, Comparing different version of a page
- Editing a page including uploading file attachments
- Creating a user account, login, changing of user preferences
- Searching and navigating within the wiki

Creating an accessible page diff is certainly one of the bigger challenges. How to compare two version of a page and tell a blind user in a short and comprehensible way what was changed in the document and where it was changed? As a first step we suggest to put the page diff into a fully accessible table, marking changes with `<ins>` and `` tags and hidden text for screen readers (see figure 2). To facilitate a more elegant screen reader output, another approach

```

<table class="diff" summary="Show differences between page revisions">
  <caption>Diff between revisions 8 and 12 (4 versions)</caption>
  <thead><tr>
    <th id="r" abbr="">Line Number</th>
    <th id="d" abbr="Deletions:">Deletions</th>
    <th id="a" abbr="Additions:">Additions</th>
  </tr></thead>
  <tbody><tr><td headers="r"><a href="#line-7">Line 7</a></td>
    <td headers="d" class="diff-removed">
      This is better th<del><span class="screenreader_info">deleted</span>e
      <span class="screenreader_info">deleted end</span></del>n that.</td>
    <td headers="a" class="diff-added">
      This is better th<ins><span class="screenreader_info">added</span>a
      <span class="screenreader_info">added end</span></ins>n that.</td>
  </tr></tbody>
</table>

```

Fig. 2. HTML output for a page diff.

would be to merge changes within a word, i.e. instead of marking single changed characters within a word, it would be better to mark the whole word as changed.

Wikis also come up with certain constraints. As already mentioned markup could become so complex and complicated in certain cases that it creates new barriers itself. A problem of open source or extendable wikis is also that these systems are not holistic, closed and tested ones. For nearly every wiki engine you can find a large amount of plug-ins and add-ons written by different authors for different purposes. These newly installed features often introduce new accessibility problems.

Merging the “wiki spirit” with accessibility opens up new dimensions: Everybody can contribute to accessibility and help building step by step a more accessible page e.g. by correcting accessibility mistakes, marking abbreviations or adding spoken page content and audio files [12] or gesture videos [13]. The wiki concept of so-called sistersites (a page in another namespace, farm wiki or remote wiki) could be used to easily switch between normal and easy language.

6 Implementation and first user tests

The above research was conducted with the MoinMoin wiki engine [14], which served as the basis for our more theoretical approach and first investigation into wiki accessibility. All of the described concepts were prototypically implemented. However, at the moment there is no single prototype available, which unites all techniques. We plan to bring all the pieces together and integrate them in the standard MoinMoin distribution in the near future. A first explorative user test with two blind persons equipped with a screen reader and Braille reader showed that especially the concepts we introduced in section wiki viewing help to considerably improve accessibility and largely speed up work.

7 Conclusion

In this paper we presented a more theoretical approach of what wiki accessibility is all about (not taken into account were drafts for WCAG2.0, ATAG2.0 and UAAG2.0 which are currently under development). We explored in the peculiarities, possibilities and limitations of wiki accessibility and presented different concepts of how to improve wiki accessibility. The main aim of the paper was to bring attention to wiki accessibility for scientific community and to give practitioners a first overview on relevant topics and a first guideline. However, scientific theoretical and empirical work as well as more practical engagement of wiki developers and accessibility experts is needed in future to make wikis more accessible.

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