

Crosschecking the Mobile Web for People with Visual Impairments

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ABSTRACT

This paper presents a reflection on the assessment of mobile Web content for people with disabilities. It proposes a rationale for an evaluation framework considering: (1) the coherent merge of state of the art guidelines on Web accessibility and mobile best practices; and (2) the usage of current and prospective practices particularly for people with visual impairments. It also presents the preliminary results of a questionnaire that validates that rationale laying the grounds for a coherent evaluation approach.

Categories and Subject Descriptors

H.5.4 [Information Interfaces and Presentation]: Hypertext/Hypermedia—*User issues*; H.5.2 [Information Interfaces and Presentation]: User Interfaces—*Evaluation/methodology*; K.4.2 [Computers and Society]: Social Issues—*Assistive technologies for persons with disabilities*

General Terms

Measurement, Human Factors.

Keywords

Web Accessibility, Mobile Web Assessment.

1. INTRODUCTION

Mobile phone usage has been exploding all over the world. With the decreasing costs on data plans, accessing the Web through these devices is quickly becoming more important to everyone. At the same time, the Web as a medium to convey information and services is being increasingly used by people with disabilities [5]. Therefore it is paramount to understand the accessibility of mobile Web content, either in order to aid developers and designers to correct accessibility issues on mobile Web sites, or simply to provide hints to users if they are worth visiting.

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The World Wide Web Consortium (W3C) has devised several guidelines (under the form of checklists) that can be used to assess the quality of Web pages in this context. Particularly relevant are the Web Content Accessibility Guidelines (WCAG) [2, 4] and the Mobile Web Best Practices (MWBP) [7]. Ideally, by following MWBP and WCAG, developers and designers should be able to create Web sites that are both usable on mobile phones, and accessible to users with disabilities. Chuter & Yesilada [3] studied the intersection of these two sets of guidelines, addressing its complexity, commonalities and differences and pointing recommendations for their practical application.

However, particularly when the evaluation of existing Web sites is at stake – i.e., its worthiness for a user – a third dimension should be considered: the users' specific impairments. Here, the question may simply be: *Is this Web site accessible to me through my mobile device?* This facet can even be taken further considering the user preferences on the device configuration regardless of disabilities.

The ACCESSIBLE Harmonized Methodology (HAM) [1] was primarily proposed as a framework for the integration of the WCAG and ICF [6], a concrete user disability classification. Chuter & Yesilada [3] can, then, be used as the basis for extending the HAM into this mobile dimension. However, merging WCAG, MWBP, and ICF is not straightforward. Usage caveats, requirements, and preferences, define a more complex mapping than simply mapping WCAG and MWBP checks. When cross-checking MWBP with usage patterns, this mapping becomes even more complex.

For example, disabling image loading on the browser precludes at least some MWBP checks. It is idiosyncratic to classify a Web page as not adequate to a user's mobile device because it contains large images, if the device does not load images. On the other hand, it should be a problem if it does not include textual alternatives. In a nutshell then, there must be a thorough scrutiny of the convergence of accessibility, mobile devices, and specific users' impairments in a Web context.

This paper proposes a rationale for the construction of a framework to address these issues. We discuss the usefulness of some MWBP regarding specific disabilities and user preferences. We particularly address the case of visual impaired users, where these conflicts are more patent.

To validate this rationale, we lay down and analyse the preliminary results of a study that aims to confirm our assumptions: informed users tend to configure mobile browsers according to their needs; and the resulting configuration renders irrelevant some MWBP checks.

2. MOBILE WEB ACCESSIBILITY

Understanding the accessibility of mobile Web content for specific impairments implies taking into consideration the technological constraints of mobile devices and its use, as well as how these impose constraints on different disabilities. Considering the current recommendation, our goal is to find a coherent subset resulting from the integration of MWBP and WCAG guidelines that applies to a specific disability (for example as defined by ICF). Pragmatically, three mappings can be considered: WCAG and disability types; WCAG and MWBP; and MWBP and disability types.

2.1 WCAG & Disabilities

Considering only WCAG 1.0 checkpoints, their relevance is clearly dependent on the disability type, as described elsewhere [8, 1]. Table 1 shows an exemplifying and representative subset of such dependence. Analysing the WCAG guidelines and checkpoints, and considering the context when they apply, one easily reaches the conclusion that the accessibility checkpoints that are relevant to a disability type when using a desktop do not change in principle on a mobile setting. The rationale for this is based in the fact that background for the definition of the accessibility guidelines is itself the characterization of user disabilities.

2.2 MWBP & WCAG

The relationship between MWBP and WCAG has been documented and discussed before [3]. It is accepted that compliance with the MWBP helps go towards achieving compliance with some WCAG checkpoints and to some extent vice-versa. A classification of three levels of effort is provided (nothing, something, and everything), conveying amount of effort required to apply the guidelines of the second set (e.g., WCAG or MWBP) once the ones from the first were checked (e.g., MWBP or WCAG, respectively, for the same example).

However, in light of this WCAG/MWBP relation, one should not expect that once we apply the specific disability filter at the WCAG set, the irrelevant WCAG guidelines for that disability will render the corresponding MWBP also irrelevant. Here, the mobile usage constraints may still apply.

Take for example, WCAG 1.0 Checkpoint 2.1 (or Criterion 1.4.1 in WCAG 2.0), related to visual impairments [8], and the corresponding `USE_OF_COLOR` check from MWBP. Considering a Web content evaluation for a non-visual impairment disability profile, checkpoint 2.1 would not be assessed in a desktop setting. Nevertheless, MWBP for that criterion still applies, since mobile devices may still have poor colour contrast.

2.3 MWBP & Disabilities

On the other hand, we also claim that it is not necessary to assess all MWBP guidelines and that its eligibility for Web content evaluation depends on usage preferences, potentially determined by a specific disability. The most notorious cases apply to visually impaired users. Table 2 shows a set of MWBP guidelines that may be considered irrelevant (those not marked with an “x”) for assess mobile Web content directed to a particular disability type (see the next Section for further discussion).

Considering the low-vision disability type, some aspects are noteworthy to mention. Some partially sighted users can

read some information on desktop monitors using operating system or browser’s magnifying capabilities. Others won’t be able, even on large desktop displays, to access Web content without using an assistive tool with some screen reading capabilities. On existing mobile device displays low-vision impairment is further stressed by the small display size. Consequently, as can be perceived on Table 2, we consider that low-vision users do not have the capabilities to access mobile Web contents without an assistive technology use such as a screen reader.

2.4 The Rationale

Based on the previous discussion on the mapping between guidelines and disabilities, the rationale for the selection and application of guidelines aiming Mobile Web Accessibility evaluation for specific disability profiles should consider the following steps:

1. Select only those WCAG guidelines that are relevant to the targeted disability type;
2. Select only those MWBP guidelines that are relevant to mobile device usage and consider the usage patterns potentially adopted by users with the targeted disability type;
3. Adopt the recommendations for the levels of effort defined on the relation between WCAG and MWBP, but only considering the guidelines subsets identified in the first two sets.

For the first step, a standard mapping between WCAG and disability type can be used to identify the relevant guidelines. For the second, foremost one should find the usage and configuration patterns that users typically apply to their devices depending on the disability type. Based on that, the relevant of applying each MWBP should be assessed, thus selection of adequate MWBP guidelines. Finally, for the last step, one could start by considering all guidelines of the WCAG subset on the mobile Web accessibility evaluation. Then, for each one of those guidelines, the mentioned WCAG/MWBP relation can be used to exclude the corresponding guideline of the MWBP set, as long as the corresponding effort level is *nothing*. Once the subset of WCAG guidelines is exhausted, all MWBP guidelines that were not excluded should be applied for a complete coherent evaluation.

It is important to stress that the approach aims the evaluation of existing Web sites in terms of navigation/visit worthiness. The support for the development of mobile Web content should preferably consider the whole set of guidelines thus complying with the *Design for All* principle.

2.5 Usage & Configuration Patterns

Regarding the rationale and its application to a coherent evaluation process, one of the commonly reported issues is the identification of usage/configuration patterns that can be correlated with specific disabilities.

Table 2 derives from the assumption of such patterns, in two dimensions. For example, checking `FONTS` guideline is irrelevant for a visual impaired person profile since he/she does not see it in the mobile device (see justification above). For the same reason it is also irrelevant what the device default font set and mapping are. `IMAGES_RESIZING`,

Checkpoints	Disability Type					
	Blind	Low-Vision	Deaf	Color-Blind	Motor Impaired	Cognitive
checkpoint 1.1	x	x	x		x	x
checkpoint 1.4	x		x			
! checkpoint 2.1	x	x		x		
checkpoint 2.2		x		x		
checkpoint 6.3	x	x			x	
checkpoint 6.4	x	x			x	
checkpoint 9.3	x				x	

Table 1: Example of relevant checkpoints for disability type - a cell with x means that the checkpoint is relevant for that disability type

Guideline	Disability Type					
	Blind	Low-Vision	Deaf	Color-Blind	Motor Impaired	Cognitive
BACKGROUND_IMAGE_READABILITY			x	x	x	x
CONTROL_POSITION			x	x	x	x
! FONTS			x	x	x	x
IMAGES_RESIZING			x	x	x	x
IMAGES_SPECIFY_SIZE			x	x	x	x
LARGE_GRAPHICS			x	x	x	x
MEASURES			x	x	x	x
SCROLLING			x	x	x	x
STYLE_SHEETS_SIZE			x	x	x	x
STYLE_SHEETS_SUPPORT			x	x	x	x
STYLE_SHEETS_USE			x	x	x	x

Table 2: Relevant MWBP guidelines for disability type - a cell with x means that the checkpoint is relevant for that disability type; an empty cell means that relevance is minimal or absent

IMAGES_SPECIFY_SIZE, or LARGE_GRAPHICS, for example, are also not relevant for the user for the same reason. However, all of them have impact at the mobile device performance level. In general then, they should be verified in a mobile Web accessibility evaluation even if it addresses visually impaired users.

Its inclusion in Table 2 as not checked, though, results from an intuitively derived configuration pattern. That indirect pattern assumes that a visually impaired person should configure the browser to disable the loading of images. In that case, if images are not loaded, then and only then the referred guidelines become irrelevant.

3. ASSESSING PATTERNS

In order to verify usage and configuration patterns, we created and disseminated a questionnaire aiming to assess how visually impaired users’ use the configuration option of their mobile browsers. We have assumed that significant percentage of the users of the targeted group might not use the mobile phone to browse the Web and that an even larger percentage ignored the ability to configure the browser at the device. Therefore the questionnaire started with a small set of questions about the desktop environment (the use of screen readers, the browser configuration and the reasons for that configuration), that were repeated for the mobile setting. The questionnaire ended with a small profile inquiry (disability, usage frequency, age).

The request for participation was distributed by several Portuguese speaking visually impaired mailing lists, and is available at <http://goo.gl/Y0TEs>. Nineteen (19) responses were gathered between December 13 and January 4. Re-

spondents’ age ranged between 18 and 60 years old. Eight (8) of them were blind, whereas (9) declared to be partially sighted. Of the remainder two, it was possible to identify one as blind (in one of his/her answers to an open question). The other’s answers were ignored, thus eighteen valid participants were considered.

All participants were frequent desktop Web users (at least once a day). Half (9) declared to browse the Web using their mobile device at least once a week. Of those, four (4) are partially sighted and use no image related configuration on the browser, both on the desktop and on the mobile environment. They further declared that their mobile Web browsing was either a last resource or an access to well-known pages or broadcast sites (e.g. radio). Of the remainder five (5), all blind, three configured the mobile browser to disable image loading. Of the other two, one has that configuration of the desktop browser and complains about the page loading speed at the mobile device.

Regarding the nine (9) participants that never use the mobile phone for Web browsing, five (5) are partially sighted and use no image related configuration on the desktop browser. All but one augmented the font size or changed the CSS configuration accordingly. Of the remainder four (4), blind users, two disable images loading and the other two disable Javascript and CSS.

4. DISCUSSION

The preliminary results of the study indicate that the intuited pattern is generally valid, especially for blind persons. In fact a large majority of those users disable the image loading in the browser, mobile and/or desktop, and four out five,

do it on the mobile device or felt that they would take advantages on doing it. From the participants' comments on open ended questions we can also infer that performance is one of the reasons why they do not browse the Web on mobile devices. Here, disabling image loading would help.

Regarding partially sighted users, the results do not confirm our hypothesis. In fact none of the users disabled the loading of images on the browsers of either environment, even if they use magnifiers or other mechanisms to enlarge fonts. We believe that a deeper study is required in order to understand how these users interact with mobile devices and, for instance, at what degree of visual impairment they feel that images are no longer relevant. Overall, the number of responses is insufficient to consolidate these findings: either confirming the pattern for the totally blind; or rejecting it for the partially sighted users. Further participants and studies are required.

5. CONCLUSIONS AND FUTURE WORK

In this paper we presented a rationale for the evaluation of mobile Web content pertaining users with specific disabilities. The goal of this focused evaluation perspective was to simply assess the worthiness of visiting a page for a user or a community of users suffering from that specific frailty. The rationale builds on WCAG and MWBP guidelines, existing mappings between WCAG and disabilities profiles [1], on one hand, and WCAG and MWBP [3], on the other. However it deconstructs the simplistic views of filtering WCAG and MWBP guidelines alike, directly based on those partial mappings. Contrarily, we point to the fact that excluding a WCAG guideline for a specific disability does not imply the exclusion of a corresponding MWBP one. Moreover, we argue that MWBP guidelines application, although orthogonal to the WCAG/disability filtering, is not completely independent from the disability type. That dependence is essentially based on usage patterns and derived browser configuration patterns, which should be thoroughly understood. Based on that, we propose a scheme to select the coherent set of guidelines from WCAG and MWBP that match a specific disability. This is the main contribution of this paper.

Finally, we presented the preliminary results of a study that aims at validating browser configuration patterns for visually impaired users that can be used to filter the adequate MWBP guidelines. Although not totally conclusive – considering the number of responses –, the results indicate that the pattern is real, particularly for blind users.

As future work, we plan to reenact the dissemination of the study in order to gather a more representative number of participants. We intend also to deepen the arguments behind this configuration pattern, especially for the minority that does not adhere to it, and also explore other patterns. At the end we intend to obtain an exhaustive mapping between disability profiles, mobile user agents' characteristics, and WCAG and MWBP guidelines, or even finding new usage scenarios that might further extend them.

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