



Improving Accessibility Support for Web Developers¹

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Abstract. Despite many initiatives over the last decade to improve web accessibility for people with disabilities, the accessibility of websites has barely improved. This PhD research examines web developers' mental models to understand why they are failing to create accessible websites and what can be done to better support them. It describes the development and evaluation of a new accessibility information resource for assisting web developers in the creation of accessible websites and applications.

Research area. Web accessibility, web development, and mental models

1 Research problem and hypotheses

Web developers have an obligation to develop websites that are accessible and usable by the broadest range of users, including people with disabilities. Over the last decade, there have been many initiatives to improve the accessibility of websites for people with disabilities. This has resulted in a well-established body of accessibility information, often presented in the form of a set of guidelines or recommendations. Despite these initiatives however, the accessibility of websites has barely improved during this period and, according to certain studies (e.g. [4], [6]), has worsened.

The second version of the Web Content Accessibility Guidelines, WCAG 2.0 [8], comprises a complex suite of documents that assumes the reader understands a considerable amount about people with disabilities and the assistive technologies they use. There are numerous studies (e.g. [1-3]) and much anecdotal evidence suggesting that web developers are extremely confused by the guidelines. What is less evident is what is the nature of the confusion and why that is resulting in inaccessible websites.

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One approach may be to focus upon web developers' mental models of the web development process and how the needs of disabled web users can be fitted into these. A study by LaToza, Venolia and DeLine [5] concluded that software developers go to great lengths to create and maintain rich mental models of code that they rarely explicitly record. Web developers undoubtedly have mental models of their web development process, reflecting their knowledge and understanding of the process. However, it is unclear whether their mental models incorporate an adequate understanding of disabled users and how best to support them through accessible coding practices. By examining web developers' current mental models, I will understand not only their knowledge of web development but also their awareness of web accessibility and the needs of disabled users.

My hypotheses are:

- Exploring web developers' understanding of web accessibility and web development practices will provide an indication of the misconceptions, errors and knowledge gaps that result in inaccessible websites.
- Developing an accessibility information resource that addresses the misconceptions, corrects the errors and fills in the knowledge gaps will support web developers to form more useful and maintainable mental models and foster a greater understanding of web accessibility.

2 Proposed method and solution

The first stage of my research explores the current state of web accessibility and the existing working practices of professional web developers. It also establishes their needs and requirements with regards to web accessibility resources, and gains an understanding of their mental models of web development processes and web accessibility. Three key findings emerged from this stage as to why web developers struggle with accessible web development. The first is that existing accessibility information resources use domain-specific terminology with which web developers are often unfamiliar. The second is that the organisation of existing resources is often different to how web developers approach web development. The third is that existing resources tend to overwhelm web developers by presenting too much information at once.

The second stage of my research focuses upon what can be done to improve web developers' understanding of web accessibility. It documents the development of an accessibility information resource, called WebAIR (Web Accessibility Information Resource) that I have designed to change and refine the mental models of web developers and foster a greater understanding of

disabled users and web accessibility. The design of WebAIR corresponds to the findings from the first stage of my research. WebAIR avoids domain-specific web accessibility terminology and instead refers to web development terms or specific user actions in the interface. WebAIR accommodates web developers' existing approaches to web development, specifically their tendency to structure their work according to the types of web content on which they are working. WebAIR avoids overwhelming web developers with information by presenting a limited selection of example solutions drawn from the many techniques provided in WCAG 2.0 [8]. WebAIR also provides just-in-time training in web accessibility concepts, allowing web developers to gradually learn about the domain of web accessibility and why they are undertaking specific web accessibility tests.

The third stage of my research evaluates the effectiveness of WebAIR in changing and refining web developers' mental models of web accessibility and web development practices. This stage also explores whether the resource can be integrated into the web development process to promote the long-term maintenance of useful mental models.

3 Work to date

The work I have completed to date includes:

- A contextual inquiry investigation with 13 professional web developers, and an online survey, completed by 60 respondents from across Europe. The aim of this was to explore the role of web developers in much greater detail in order to understand their working practices and establish a set of requirements for providing accessibility support.
- An interview-based study of web developers' mental models, conducted with 26 professional web developers. The aim of this was to explore their understanding of disabled users, web accessibility and web development practices.
- An initial validation of my proposed solution, WebAIR, with 26 professional web developers and 7 student web developers [7]. The aim of this was to validate WebAIR with both professional and student web developers and explore their initial impressions, using a rating scale and a short interview.
- An evaluation of WebAIR with 50 student web developers. The aim of this was to determine the effectiveness of WebAIR in allowing student web developers to identify and address accessibility problems.

I am currently planning a further evaluation of WebAIR with professional web developers. The aim of this is to explore how they use the resource and

whether it corresponds to their mental models of web accessibility. Participants in this study will be recruited to take part in a longitudinal diary study of WebAIR, which will further explore the effectiveness of WebAIR and investigate the long-term maintenance of useful mental models.

4 Contributions and open questions

The expected contributions of my research include: an exploration of the mental models and working practices of web developers; greater insight into why web developers are failing to create accessible websites; an understanding of the accessibility information necessary to change and refine web developers' mental models; and an evaluation of the effectiveness of WebAIR in fostering a greater awareness and understanding of web accessibility.

At the Doctoral Consortium, I would like to share my experiences of conducting studies “in the wild” with professional web developers. I would also like to discuss the value of examining mental models of web accessibility and the robustness of the methods I have used to elicit, analyse and interpret them.

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