Classic Accessibility Checks Fail eReaders

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***Short Abstract* — Evaluations undertaken for digital materials and technologies that consider accessibility and ease of use for the type of resource – device, software or digital content – tend to be assessed in isolation. In doing so they exclude the importance of the interrelated aspects of accessing eBooks, failing to support the needs of those with print disabilities: such as visual impairment; dyslexia; and/or physical difficulties. Each individual embarking on the process of reading digital texts must: choose an eReading device or application; navigate and access the eBook market-place; decide on or by choice of device or software, accept a type of format; and then interact with the eContent.**

This paper aims to illustrate how we, by combining a group of accessibility standards, guidelines and criteria, evaluate these facets of eText accessibility using a single review method. The combination of evaluation scores with descriptions has the potential to help users, those supporting the users and those providing or developing content to gain an understanding of accessibility issues that may arise. Since no accessibility guidelines exist specifically for mobile eReader applications, this paper identifies a framework for user centred accessibility criteria, incorporating all aspects of eReading that could enhance existing guidelines.

I. INTRODUCTION

Existing accessibility guideline criteria aid the evaluation process: for Web 2.0 services; software applications; and hardware. Web 2.0 services are where the user interacts with the content beyond just reading. The guidelines referred to here are part of an evaluation process that determines the degree of accessibility utilising Conformance Review (CR) [5], whereby a severity weighting [1] of 0, 1, 2 or 3 is allocated to each user centred accessibility criteria test. Notably, there are no accessibility guidelines currently available for mobile eReader applications [2].

Print disabilities focus on three main areas of disability type: Visual Impairment (VI); dyslexia; and physical difficulties/Mobility. In the context of mobile eReader platforms, a person with a visual impairment may require increased font size, high contrast mode and/or screen reading. Individuals, who have dyslexia, may wish to change the font style, text and background colour or the space between lines of text, plus use text to speech (where just the content is read and not all the navigational elements). Readers with physical difficulties may find it difficult to turn a page or carry a large number of books and so welcome a lightweight portable reader that has easy to use menu buttons or keyboard access if touch screen menus are small.

However, it can be problematic to focus solely on disability type and the barriers that may affect user interactions [4]. It is for this reason that the adoption of a holistic approach [4] is required, in that all readers may have personal preferences for the way they work with their reading materials and an aging population, who do not necessarily see themselves as disabled, can also benefit from increased accessibility options.

Increasingly the Web is accessed through mobile gestural devices such as smartphones and tablets [6], enabling users to search for information or content on demand. Historically libraries tagged manuscripts with brief descriptive text in order for librarians to find or locate them [7]; this type of tagging can be referred to as ‘metadata’ – or data about data. If digital content is correctly tagged it enables machines to recognise what is contained within the text and to open up possible avenues of accessibility [3].

II. METHODOLOGY

We utilised a mixed method approach for this study, whereby both quantitative and qualitative data gathering occurred in line with CR and severity weighting scores. In order to enhance analysis we compared archive-to-current reviews, alongside expert-to-novice audits.

For this study each application or software program was scored on a total of 15 Web 2.0 service criteria tests or 15 software criteria tests. The Web 2.0 tests ranged from the accessibility of login and alternative text for images to text size, style and readability; whereas the software tests determined the accessibility of built in assistive technologies and added help documentation access.

III. RESULTS

In Table 1 we provide a sample of the test results for dedicated eReading devices, with a distinction being made between the product type tested, such as operating system software or the application running on a device or Web 2.0 service. Examples include devices such as the Kindle and eReading applications available on smartphones and/or tablets. Each product test result is presented as a percentage of accessibility against combined disability type.

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Table 1: Sample eReading Test Results

PRODUCT	TYPE	TEST AVERAGE
Adobe Digital Editions 1.8.3 (MAC OSX Desktop)	Software	87%
Adobe Digital Editions 1.8.3 (Windows Desktop)	Software	93%
Blio 3.3 for iPad (iOS 5 and 6)	Application	89%
Blio 3.3 for iPhone 4.0	Application	96%
Kindle Cloud Reader	Web 2.0 Service	62%

IV. DISCUSSION

Whilst the results indicated a platform for measuring accessibility, we realised that classic accessibility criteria were not sufficient for gestural accessibility assessment. The criteria did not emphasise the complexity of the interrelated aspects of accessing eBooks, particularly how an eReader may prevent access to an eText that is already compliant with an accessibility standard. Furthermore, we also became aware that certain applications were accessible, but access to their functionality was limited by the operating system of the mobile platform. The iOS Mac platforms, however, enabled the user to successfully traverse from the operating system to the applications.

We identified a new framework for gestural accessibility assessment during the course of this study. The Web Domain Analogy Framework (WDAF), shown in Table 2, was identified and may aid readers who are unfamiliar with the eReader/eBook or mobile domain. Whilst the WDAF consists of five interrelated layers both horizontally and vertically, it should be noted that, if the interrelated aspects of the framework are hindered then so is the potential for accessibility.

Table 2: Web Domain Analogy Framework (WDAF)

THEME: WEB DOMAIN ANALOGY LAYERS	ATTRIBUTE: FOR EREADER/EBOOK DOMAIN
Search Engine/Discovery Layer	Market Place – eBooks are found or located at an eBookstore
Web Metadata	eText Metadata – metadata enables machine readability.
User Agent (Web Browser)	eBook Reader – the application or dedicated eReader acts as a browser
Web Page	eBook Content – equates to the content of a Web page
Web Formats: HTML 5, Flash	eBook file formats: EPUB3, AZW, PDF

V. CONCLUSION

This paper presents the importance of the interrelated aspects of accessing eBooks and highlights the need to increase the granularity of classic accessibility criteria, by incorporating gestural accessibility assessment for mobile eText platforms. It illustrates how a combination of standards, guidelines and criteria can support a framework to aid accessibility evaluation for all eReader stakeholders.

A. Limitations of study

Gaining access to a wide variety of mobile device platforms and related technology was problematic and proved to be a limitation in this study, as were the time constraints for testing. Updates made to the applications, operating systems and eBook coding required several re-evaluations, and in some instances accessible applications became inaccessible or improved their accessibility during the course of the study.

B. Further Research

Future development of Personal Accessibility Preferences (PAPs) based on the WDAF may provide avenues for the use of recently ratified accessibility metadata. In addition to this it may be possible to automate the process, in that the interrelated aspects of mobile domain accessibility can be read by machines and then identified by current Web technology.

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BIOGRAPHIES

Neil Rogers has over ten years' experience in the news media and publishing sectors, with extensive technical production expertise in producing digital content. Whilst working in the publishing sector he gained over six years' experience as a Production Manager, where he was the lead for data2page. In addition to this, he graduated in December 2012 at the University of Southampton, and gained a Master of Science by Research in Computer Science with Distinction and is now a PhD candidate at the same institute.

Dr. Mike Wald leads research into accessible technologies in the Web and Internet Science Research Group, ECS and has advised HEFCE, JISC, BECTA and Universities on enhancing learning through the use of technologies. He established the University's MSc in Computer Based Learning and Centre for Enabling and Learning Technologies (CELT) in 1994 and was involved in the establishment of the University's Disability

and Assistive Technology Services. He is a founder member of the International Liberated Learning Consortium that includes other leading universities (e.g. MIT) and organisations (e.g. IBM, Nuance) and is investigating how speech recognition can make teaching and learning more accessible.

E.A. Draffan trained as a Speech and Language Therapist, before specialising in the field of Assistive Technology and Accessibility. She has since worked with disabled students in Further and Higher Education, set up an Assistive Technology Centre, contributed to the work of JISC TechDis and other institutions and groups. She was a member of the committee that worked on BS 8878, is the UK national contact person for AAATE and on RAATE, AHG, BDA and BCS committees. She is now a Senior Research Fellow at the University of Southampton with interests in the ease of use and accessibility of cloud based services, mobile technologies and the mainstreaming of assistive technologies.