Website Accessibility Practical System

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ABSTRACT
A tension in accessible website design is that valuable information is scattered across different published sources. The efforts to become a subject matter expert on accessible design must be exerted by individuals and teams designing and coding websites. There is no one single source to reference when seeking pragmatic solutions for rapid accessible design needs. Individuals and teams may not have the time, financial resources, personal experience, or personnel to achieve accessible design. Government websites have been found to outperform commercial websites but can still contain barriers to access for people. This report shares the Website Accessibility Practical System as a quick to use, single source tool for accessibility then demonstrates its use and efficacy by being applied to two different government websites for the same entity.

KEYWORDS
Human-centered computing, Accessibility, Accessibility design and evaluation methods

INTRODUCTION
Definitions of what constitutes a disability can be nebulous and cover a diverse range of temporary and permanent forms of impairment [6][15]. The number of people in a population who can be identified as having disabilities is fluid and is currently trending upward in our aging population [6]. For example, the number of people with visual impairments and hearing loss are growing in our aging population [15]. The medical community is currently concerned with impacts from COVID-19 "Long Hauler Syndrome" which may increase the number of disabled citizens as more is learned about how the disease damages internal organs which can include the brain [1].

Online access is now the dominant media for the public to engage with government. Being able to go online is now necessary to access to government information, functions, and programs [6]. The amount of government content and services available online will only grow as using websites lower the cost of operation for government functions, thus promoting an increase in online presence and tools [6][7][9]. Website access is beneficial to society by increasing participation in government and voting [2]. Government information and communication technologies that exist online may be referred to as "e-government" or "egovernment" [5][9]. Being able to vote online has been found to bring voting participation closer to parity for people with disabilities compared to people without disabilities [2][13]. It is also ethical to strive to treat people more equally within a society [14]. The Americans with Disabilities Act (ADA) covers access to websites for all people as necessary, making it possible for people to sue any entity people found to have barriers to access a due to physical limitations that bars them from using the same services and tools [7]. State and federal government websites have overall better accessibility than commercial sites [15]. It is still common to find people with disabilities are not able to access contents on a government website [4]. It is still common to find accessibility problems on a government website even though they are created with accessibility in mind [7].

The Website Accessibility Practical System (WAPS) seeks to use 25 lines of items on its checklist to cast as wide a net as possible so designers and coders can make website publishing as inclusive as possible. WAPS seeks to be a faster, more practical tool that is easier to learn and put into use by website professionals. The tool is geared to pull together the various concepts, resources and tools scattered across academic literature and the internet into one succinct page. WAPS is intended as a foundation for designers to continue to learn about website accessibility rather than a substitute for continued study. An interactive version of the tool with easy access to the methods and online resources used is available as an Excel spreadsheet online by direct download: https://shellielewis.net/waps/WAPS_Checklist.xlsx.

Two accessibility barriers that are not recognized ADA physical limitations which are included in sections 6 and 7 of WAPS are: 1) cultural differences created by a user's native language or education level, and 2) the fact that poverty can limit access to go online to mobile phones running on cellular networks whereby a lack of mobile responsive website usability can block website access for people [10].

BACKGROUND: A TALE OF TWO WEBSITES
This project started with the discovery of a unique situation where a government entity has two versions of their website published live at the same time for the Clerk of the Circuit Court in Cook County, Illinois, USA. These two websites

serve the same entity and were both live at the time of this report.

Old Site	http://cookcountyclerkofcourt.org/INCLUDES/main.asp
New Site	http://www.cookcountyclerkofcourt.org/NewWebsite

These will be referred as the Old Site and the New Site for the rest of this report.

Was the reason for the New Site was to improve accessibility? A content inventory was completed for both sites to learn about their differences. The Old Site has 9 pages that are not available and do not exist (404 Error Code). The overall visual design is very dated and looks like a late 1990s to early 2000s website. The Employment page is outdated and refers to the prior office holder, Dorothy Brown, whose time in office ended November 30, 2020. The New Site could have been created as an aesthetic build when a newly elected politician, Clerk Iris Martinez, took office on December 1, 2020 and might have only contain visual changes.

The content inventory demonstrated the New Site was intended to improve accessibility. The Old Site has a pop-up window that asks if you want to go to the New Site and links to it. A user needs choose between two links to elect to either use the New Site which is offered first or continue to the Old Site. The first interactive element on the home page of the Old Site is a wheelchair accessibility icon that links to the New Site. The Old Site has 150 elements for navigation in the top navbar, a left side cart, a right side cart, and the footer. There are 61 elements of navigation (61 out of 150) on the Old Site that link it to the New Site.

The New Site has a much more contemporary visual design and removes the side cart navigation on the left and right. Navigation items are found in the top navbar menu and in the footer. The top navbar and footer offer a total of 82 elements for navigation which removed 68 elements and simplified the top navbar by using nesting menus. There are three elements on the New Site that link back to the Old Site: one pages hosting the login for database searches (County Docket Search) and two pages hosting forms (Email Case Notice Service and Attorney Email Registration). General members of the public are pushed to the New Site. Attorneys, advocates, law enforcement, and other members of the legal community still need the database and forms on the Old Site which have not been migrated to the updated New Site. One item in the top navbar menu, Resources > Media > Video Library, has no content / does not link to anything. Two pages break with the New Site because the top navbar and footer navigation disappears: Online Case Search and Pay Tickets Online. Overall, pages linked to database tools break with the design of the New Site.

HOW WAPS IS DESIGNED TO WORK
This section gives an overview of and the purpose for each the WAPS sections. The seven categories cover physical and social barriers to accessibility. This tool is intended for evaluation an existing website. Go through each item and see if the accessible design feature given on the checklist is needed in the website. Each item that is found to be lacking or designed incorrectly earns 1 point in the left-most column. You will be counting the problems found. For example, if you have 3 points from the WAPS checklist then there are 3 things to change to improve accessibility. There is a possible maximum of 25 points. Point totals can be used to compare website or pages of a website as needed.

Overview of the WAPS Sections
1) This section seeks to cover needs for visual differences including low vision, color-blindness, and a lack of vision. Special attention is paid to the needs of screen reader technology.

2) This section covers needs for people who are Deaf or hard of hearing.

3) Manual needs are covered here for people that require a keyboard to access website content or consider targeting buttons and interactive elements for a non-keyboard input device (NKID).

4) Needs for cognitive barriers to access are very variable. This section covers accommodating dyslexia, preventing seizures, and how to avoid elements which have been found to affect people with autism and attention deficit disorders.

5) Error-free robust code is needed for assistive technologies used by a wide range of people. If you have proper and consistent code, it will help current and future assistive technologies used to navigate online.

6) Cultural differences can be barriers to accessibility, and this section reflects ways to consider if text is easy or difficult to understand based on the educational level and the native language of the reader.

7) Mobile accessibility over cellular networks is necessary because without it website contents such a government services are primarily, and possibly only, available to those with the economic means to afford a computer or laptop and have in-home internet access (10). Twitter Bootstrap open-source response website code framework launched August 19, 2011 (12). Websites working well on mobile devices is necessary as the number of people using mobile devices keep increasing (10).

THE WAPS CHECKLIST
Review your website using sections 0 – 7 that follow. A complete Excel spreadsheet version of the checklist is available online by direct download https://shellielewis.net/waps/WAPS_Checklist.xlsx.

Acquiring and using the Excel spreadsheet version is recommended as it has links and tips to conduct the steps in the process. The References section of this report is also useful to understanding the details of the tool design.
WAPS Checklist

0) Preliminary Task
existing site: Content inventory the entire website
new site: Can you create a template to use for the pages? [7]

1) VISUAL
    a) resize text larger for low vision [7][19]
    b) passes visual contrast testing [25]
    c) passes colorblindness simulation testing [3]
    d) color alone is never used to convey content [19]
    e) <alt> attribute is used for images [23]
    f) semantic code is used [19][22]
    g) ARIA Framework is used [8]
    h) labels for form controls, input, and other user interface components [19]
2) AUDITORY
    a) subtitles for any video [19]
    b) text transcript for podcasts or audio recordings [19]
    c) sign language interpretation for video [19]
3) MANUAL
    a) working keyboard navigation [20]
    b) links, buttons, large enough to activate by touch [19]
4) COGNITIVE
    a) readability test for reading level [26]
    b) avoid flashing images and rapid animations [19]
    c) avoid autoplay content [19]
    d) give user the control to stop autoplay content [23]
5) ROBUST CODE
    a) W3 Consortium Nu [17]
    b) W3 Consortium Jigsaw [16]
    c) HTML Tidy [11]
6) LANGUAGE
    a) identify the primary language of the page [19]
    b) readability test for reading level [25]
7) ECONOMIC
    a) mobile responsive to scale for smartphones, tablets [10]
    b) text font scales large (14pt +) for legibility on mobile size screens [19]
    c) links, buttons, large enough to activate by touch [21]

SCORE: 1 point for each item that is needed in the design

WAPS DEMONSTRATED
Now let us return to the two live websites that are online for the Clerk of the Circuit Court of Cook County. This section applies WAPS to the Old Site and the New Site.

Accessibility problems were found on both websites with much worse score and many more problems existing on the Old Site which earned a score of 16 points.

The new site has three smaller problems and one significant content differences which lead to a score of 5 points. Even though it seems the intentions for creating a new site were to improve accessibility, there are areas to investigate on how to continue to improve the New Site. The specific problems found that follow are placed in the categories given in the WAPS checklist.

WAPS for the Old Site
Problems found:

1) VISUAL
a) the layout breaks and content is hidden at the slightest zoom in on browser.
b) colors on right side cart (background #010a97 and text #0209e0) fails testing with a ratio of 1.41:1
e) failure to use <alt> attribute to describe images throughout the website
2) AUDITORY
c) video on the home page has no options for an ASL interpreter version
3) MANUAL
a) Cannot reach left side cart with tab key / keyboard navigation
b) buttons smaller than 45 x 45 pixels
5) ROBUST CODE
a) W3 Nu has 289 errors and warnings
b) W3 Jigsaw has 22 errors
c) HTML Tidy recommends to remove inline scripts
6) LANGUAGE
a) HTML <head> does not identify language of the site
SCORE: 16 points

WAPS for the New Site
Problems found:

1) VISUAL
e) <alt> attribute used incorrectly for one item on the home page. The HTML has <alt>="img" the white seal for the Office of the Clerk of the Circuit Court of Cook County
4) COGNITIVE
c) carousel for Programs and Special Services scrolls automatically
d) user cannot pause scrolling of carousel for Programs and Special Services
5) ROBUST CODE
a) W3 Nu has 34 errors and warnings
b) W3 Jigsaw has 6 errors
SCORE: 5 points

CONCLUSION
The WAPS checklist gives a way to compare the differences from the Old Site to the New Site in terms of overall points and also allows designers and coders to

review specific areas to seek to improve accessibility. WAPS gives a wider definition for accessibility than the W3 Consortium WCAG 2.0 checklist [24].

The Excel spreadsheet version of the WAPS checklist has a word count of 287 words with a Read-O-Meter estimated reading time of 1 minute and 8 seconds (https://niram.org/read/). The W3 Consortium WCAG 2.0 current list of guidelines (https://www.w3.org/TR/WCAG20/) has a word count of 13,693 and a Read-O-Meter estimated reading time of 68 minutes and 45 seconds. A website links count checker with Small SEO Tools (https://smallseotools.com/website-links-count-checker/) lists the W3 Consortium WCAG 2.0 current list webpage as having 680 links. These links define and give guidelines for the WCAG 2.0 checklist.

Project Reflection

Is website accessibility in danger of being ignored as teams, designers, and coders are finding themselves working within Agile business models that demand increasing amounts of labor from a smaller pool of professionals operating on increasingly faster timelines. The failure to meet accessibility needs for people in USA government websites can be corrected with lawsuits under the Americans with Disabilities Act, but this is a regressive road to reform that places a burden of seeking improvements through the legal system upon the shoulders of people with the barriers to access. It is optimal to design and improve websites with accessibility features as an integral part of the design. Research in this project showed how the database-related parts of the Old Site were abandoned in the creation of the New Site. Will future HCD professionals have to face increasing economic pressure which will encourage trade-offs in accessible design features to meet the demands project profitability?

FUTURE WORK

There are automated systems and software that check website for accessibility issues [14]. There are no studies comparing accessibility reviews by automated systems review versus human review. Do automated systems fail because they simulate a disability rather than reflect how it operates in the real world? It is also possible that reviews of accessibility by humans may be subject to bias of the reviewer [4]. This may be relevant as artificial intelligence (AI) continues more tasks and jobs from human labor.

Website accessibility lacks longitudinal studies so researchers can learn about design changes over time [14]. There is one example of a longitudinal study which involved 25 Maryland state government websites from 2009 to 2012 as the only published study by Lazar et al [7]. There is a global lack of longitudinal studies of website accessibility [4].

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