

Web Design & the Visually Impaired



Table of Contents

Discovery	5	<i>Design Drivers</i>	42	<i>WAT Specifications</i>	94
<i>Introduction</i>	8	<i>Venn</i>	44	<i>WAT Assets</i>	96
<i>Problem Statement</i>	10	Ideation	46	<i>Video Walk Through</i>	110
<i>Definitions</i>	11	<i>Influence Mapping</i>	48	<i>Conclusion</i>	112
<i>Data</i>	12	<i>Mind Map</i>	52	Appendix	115
<i>Existing Systems</i>	16	<i>Possible Solutions</i>	54	<i>Usability Guidelines</i>	116
<i>Nomenclature</i>	18	Experimentation	71	<i>Questionnaire</i>	118
<i>Value, Impact, Significance</i>	20	<i>Rough Solutions</i>	72	<i>User Survey</i>	122
<i>Research Methods</i>	22	<i>Solutions</i>	76	<i>Observation Tools</i>	124
<i>Scope</i>	24	Evolution	80	<i>Expert Interviews</i>	126
<i>User Observations</i>	26	<i>Designer Interface</i>	82	<i>Feature Comparisons</i>	136
<i>Research Insights</i>	34	<i>User Experience</i>	86	<i>Video Walk Through Assets</i>	142
Interpretation	38	Solution	91	<i>Works Referenced</i>	144
<i>Persona</i>	40	<i>WAT Summary</i>	92		



Discovery



Quote

It has been said within the disabilities community that there are only two types of people:

***There are those with disabilities,
and there are those who haven't
quite found theirs yet.***

*– Chris Downey
TEDCity2.0 conference*

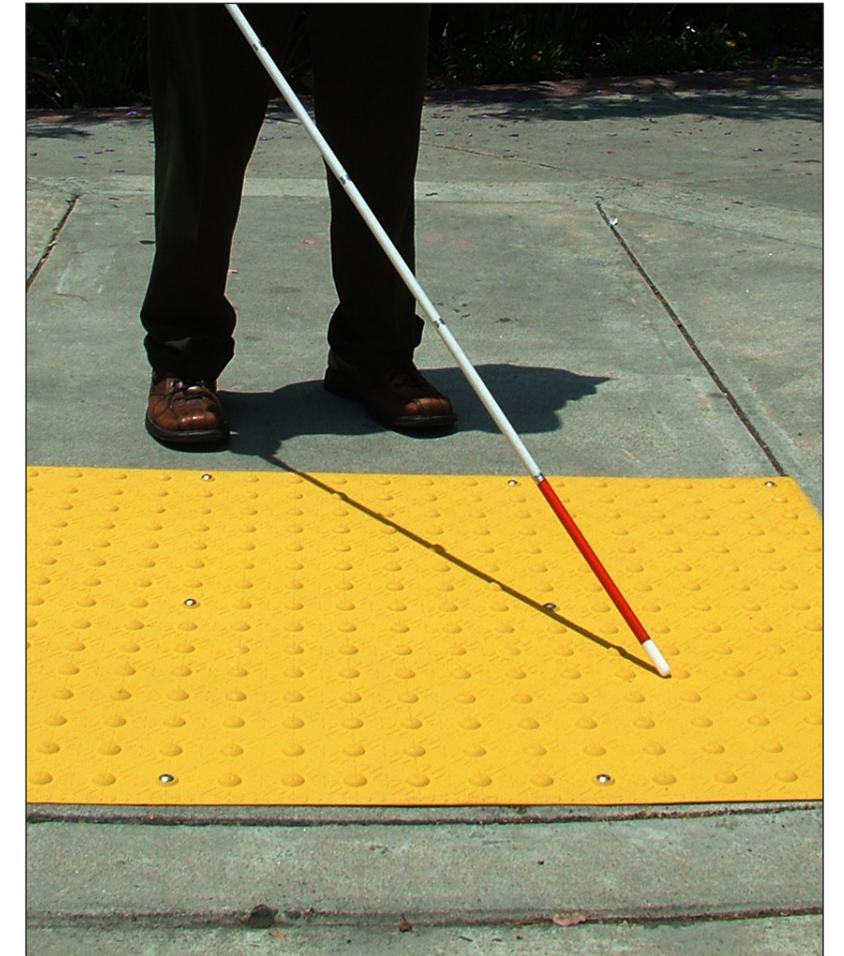
Introduction

I first became interested in usability issues experienced by people with vision impairments in 1999 while I was working at Snap.com, which would later become NBCi. Trying to be as inclusive as possible became something of an imperative as we had just won a Clio award for one of our commercials in which we depicted the usefulness of our website in educating young consumers to create bridges in communication with people with disabilities. E.g. learning sign language to make friends with the deaf boy next door. However, our concern

really only ran as deep as making sure that our images had reasonably descriptive alternative information in the image tag. It was after all only 1999 and the Web was still the Wild West and best practices were yet to be established.

After leaving NBCi I was astounded by the lack of concern of my new employer and many of my colleagues throughout the Web. Many seemed incapable of not only understanding how people with would access the Web, but why they would want to.

Flash forward to 2015 and now Usability, Accessibility and Universal Design are the drumbeats we march to. However, actual progress with Universal Design and the Web are still slow coming. This is why I have chosen to explore the issues surrounding web Usability for the blind to try and tease out potential solutions.



Problem Statement

Web designers and corporations still do not consider usability and accessibility best practices for the blind, which results in an overall frustrating experience.

Definition

According to the WHO, there are four classifications of visual function:

1. Normal vision
2. Moderate visual impairment
3. Severe visual impairment
4. Blindness

Moderate and Severe VI are combined into “Low Vision.”

In the U.S., the CDC considers an inability to read normal newsprint, even with assistive lenses, a severe vision impairment.

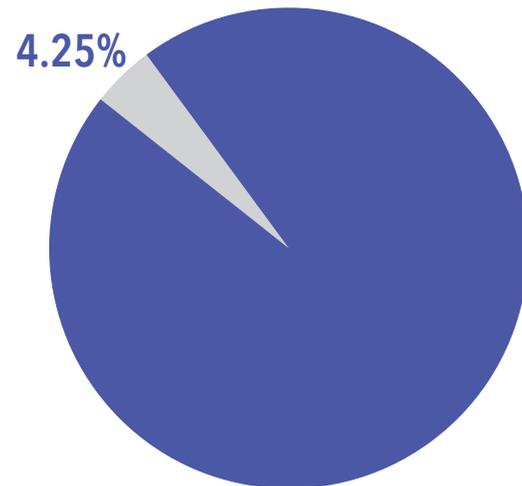


Data

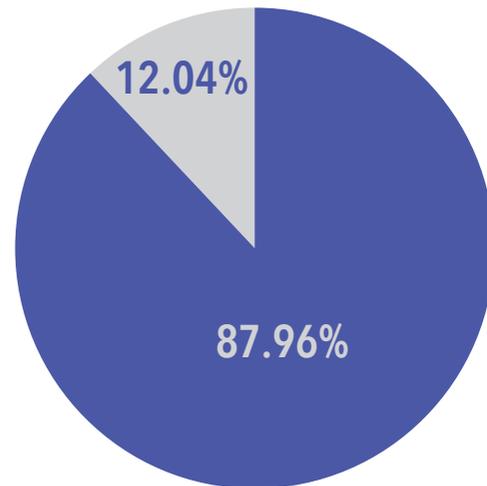
According to the World Health Organization (WHO) report on global Visual Impairment (VI).

- VI = ~285 Million
- Low Vision = ~246 Million
- Blind = ~ 29 Million

Percentage of World Population with VI

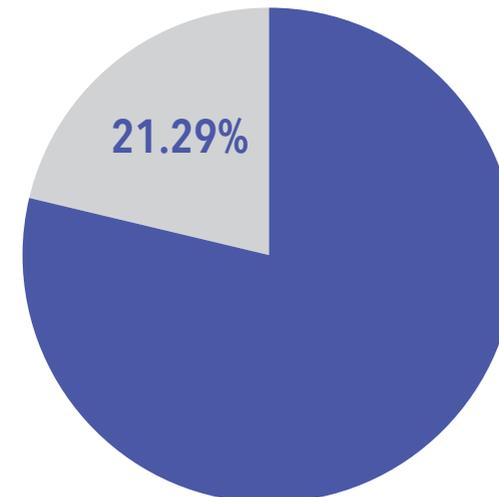


Low Vision vs Blindness World Wide

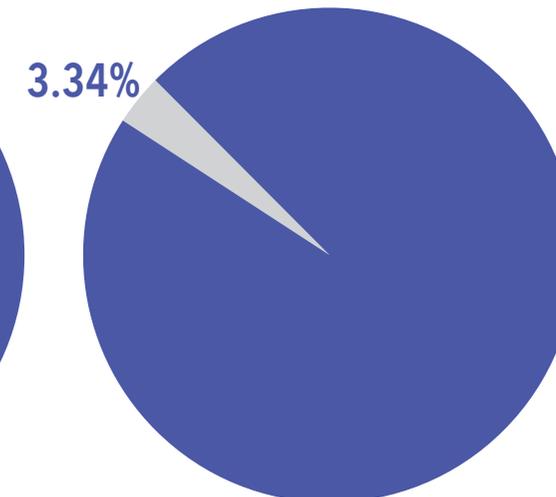


Nearly a quarter of the U.S. population has a disability. However, more than 1/8th of that population has some level of vision impairment

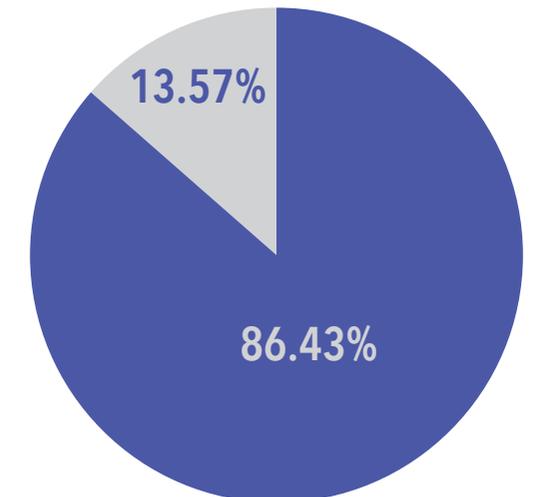
People in U.S. with a disability 2010 Census



U.S. Population 15 and older with VI 2010 Census

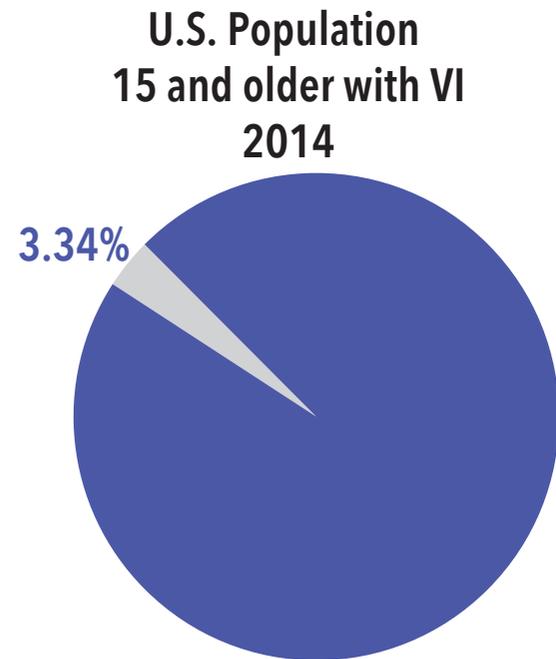


Percentage of People among disabled with VI 2010 Census

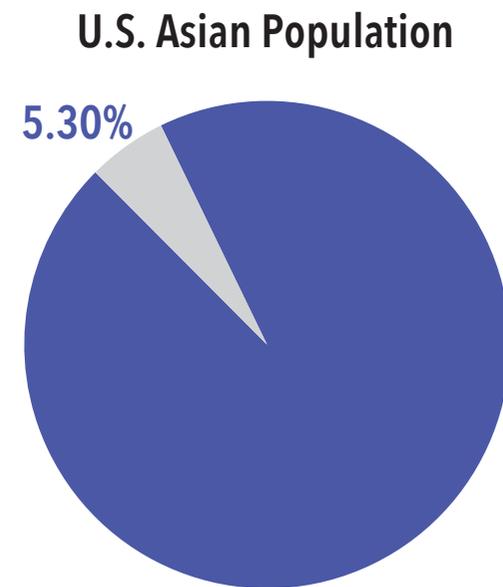


Data

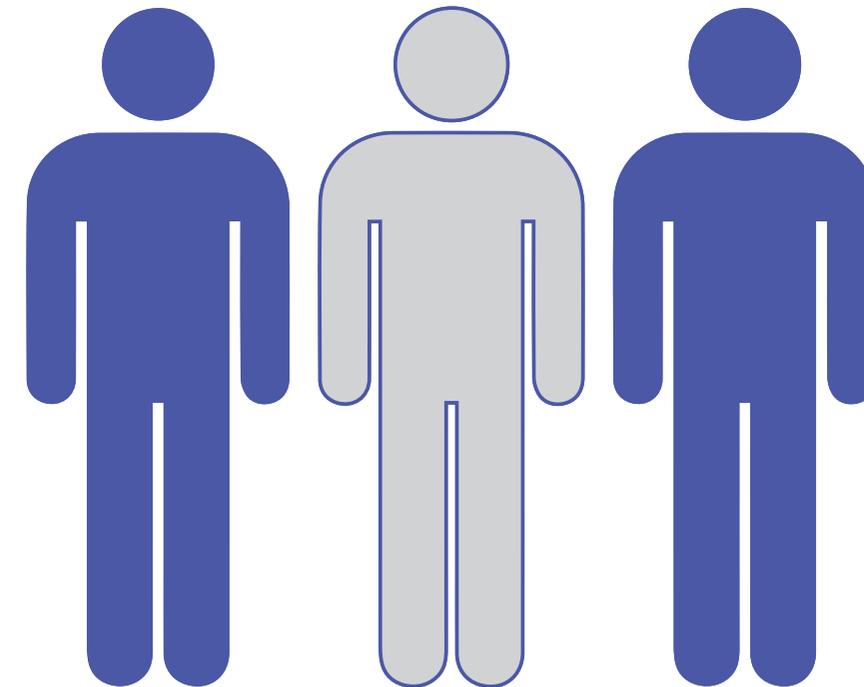
Of the 241.7 people in the U.S. 15 and older, roughly 14.9 million of them, or 3.34%, experience some level of Vision Impairment.



By way of comparison, the Asian American population in the U.S. is only 2% larger. What if every Asian American stopped shopping online over night?



In the U.S., approximately 1 in 3 adults 65 and older have a vision-reducing eye disease.

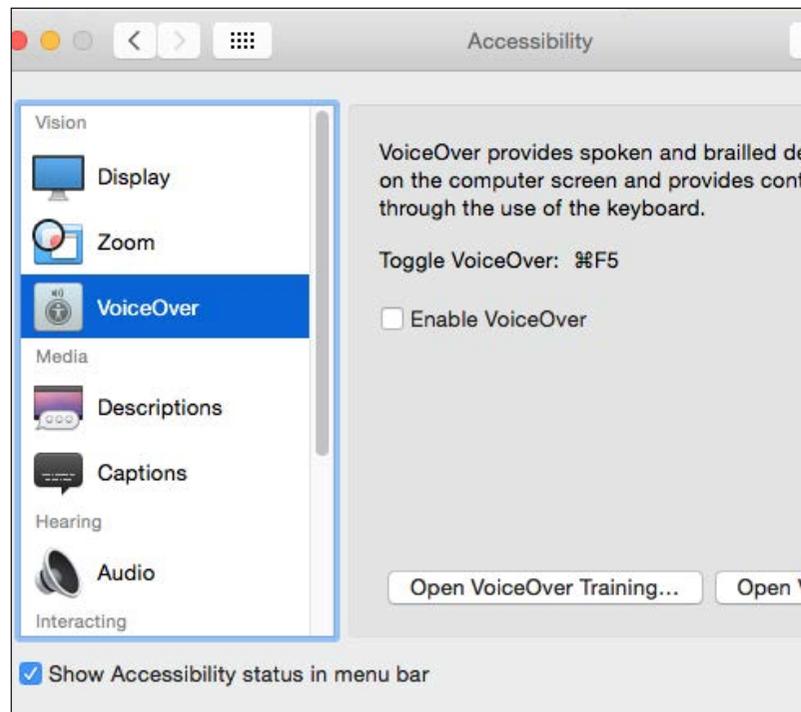


That means that of the 20 of us in this class, about 7 of us will suffer from severe vision impairment in our 60s.

Existing Systems

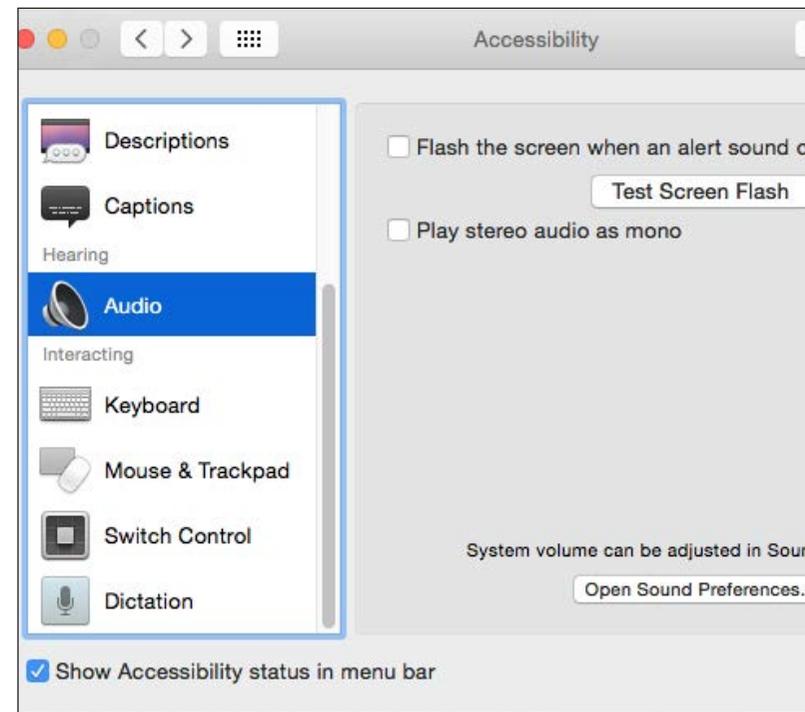
Text-To-Speech:

Third-party or built-in software that reads back text on screen.



Auditory Feedback:

A sound made in response to an action, e.g. pressing a key and hearing a click.



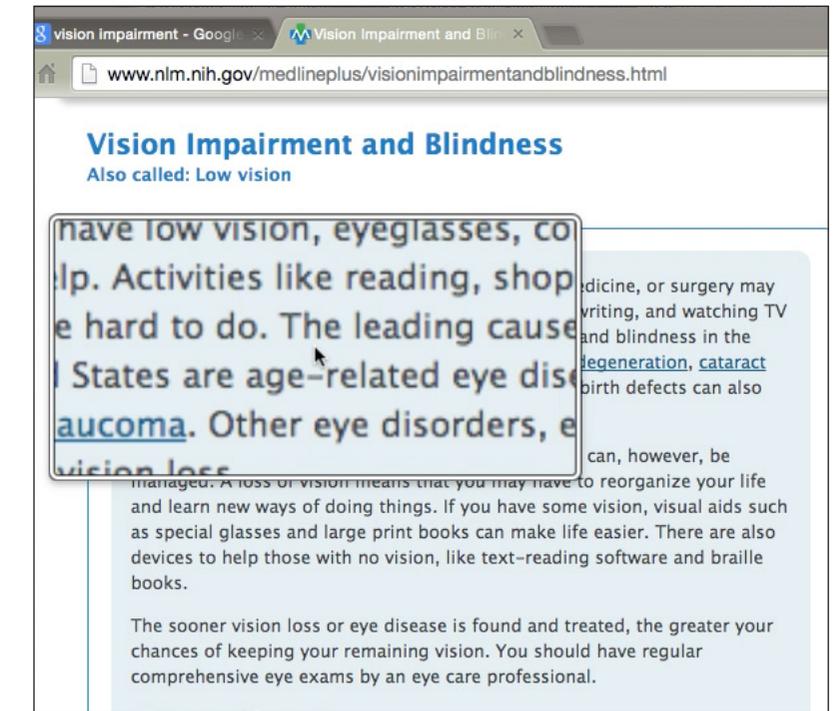
Tactile Interface:

A user interface that uses touch for input and/or output, such as a Braille reader.



Screen Zoom:

Literally zooming in to portions of a screen or enlarging the entire screen.





Nomenclature

CIL & Other Usability and Disability Experts

- Vision Impairment
- Blind
- Low Vision

SF State DPRC

- Blind
- Low Vision

Quote

Top 5 Usability Problems

- 1. Screen reader conflict***
- 2. Page hierarchy***
- 3. Poorly designed forms***
- 4. No alt Text***
- 5. Inaccessible PDFs***

*– Leah Gardner
Lighthouse San Francisco*

Value

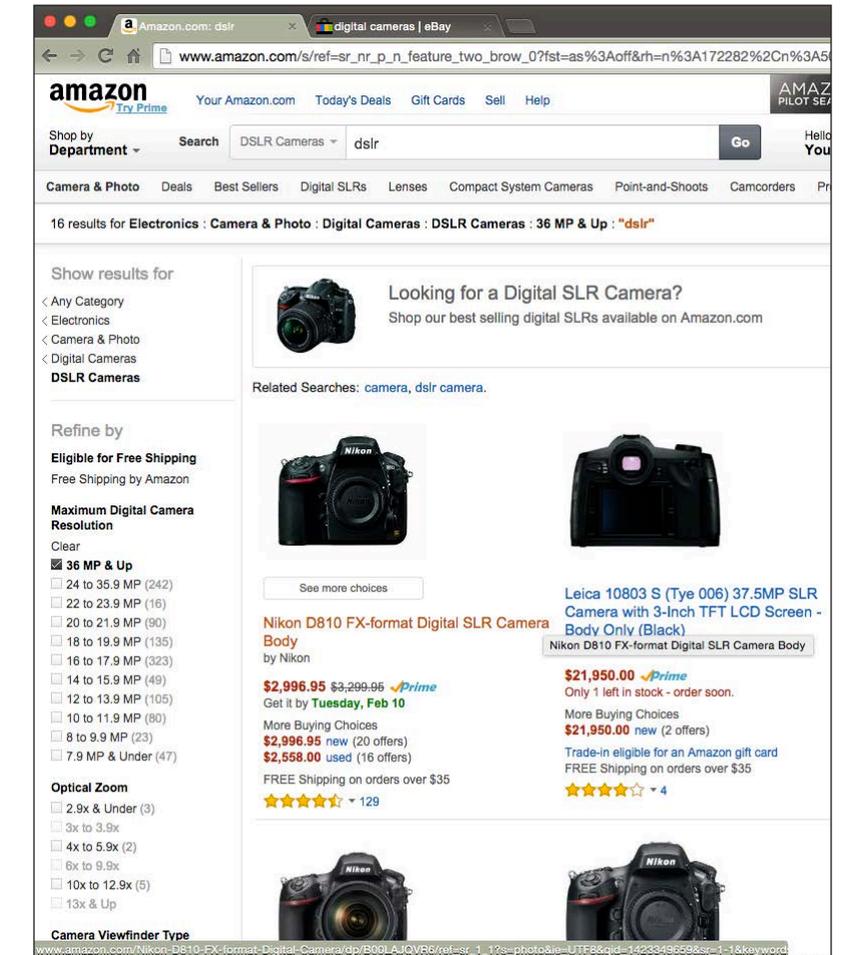
Implementing Universal Design techniques, whereby a designer or developer keep usability and accessibility in the forefront of their mind at the beginning of the design process, will improve the web experience for all end-users and will have the added benefit of improving accessibility for people with vision impairments. Additionally, our society as a whole benefits through the inclusion of a significant percentage of our population gaining access to freely available information that is most easily available via the Internet. This means that concentrating on implementing Universal Design techniques benefits society as a whole, not just the individuals formerly excluded. Additionally, including all of our citizens in our online discussions and sharing of information is the morally correct thing to do.

Impact

Improving usability and accessibility to the World Wide Web for people with Visual Impairments would have the affect of including roughly 3 1/3% of the U.S. adult population over night. What this means is that we would be building stronger communities by being more inclusive to all groups.

Significance

Any potential solution would have a significant impact on our society as a whole, but most especially on people experiencing any form of Visual Impairments. Not only would we be improving access for roughly 3 1/3% of our population, but we would also be potentially increasing E-Commerce by that amount as well. As we improve access to the Internet and the WWW, we also improve the convenience of accessing online shopping and providing more competitive rates for goods and services.





Research Methods

Contextual Inquiry It would be good for me to see the end-user's set up, so I can see their process, from start up to shut down.

Design Ethnography An in-depth analysis of the user, their environment, and their interactions within that environment.

Fly on the Wall Observing the end-user unseen may help me to formulate basic questions to ask at a later stage in the research

Photo documentation and Analysis Recording the user's desktop environment and surround area should tell me more about how the interact with their computer. For example, many sighted users have other items on and around their desk, this clutter may cause distractions for a person with Visual Impairment.

Role Playing I should do my best to replicate the Visually Impaired user experience so I can better understand the obstacles they deal with on a daily basis.

Shadowing Work along side the Visually Impaired end-user to better understand everyday activity that may be overlooked in a more formal environment, like the DPRC lab.

Surveys Circulating an online survey may expand my available test group.

Questionnaires My list of questions that I have developed after being a Fly on the Wall.

Stakeholder Mapping I have narrowed my target group to users with extremely low vision or who are legally blind.



Scope

- In-Scope*
- Visually Impaired
 - Legally Blind
 - SFSU Students
 - Desktop User
 - Laptop User
 - 18 – 39 years old
-

- Out-Of-Scope*
- Fully Sighted
 - Low Vision
 - People with other accessibility issues
 - Smartphone User
 - 1 – 17 years old
 - 40+ years old

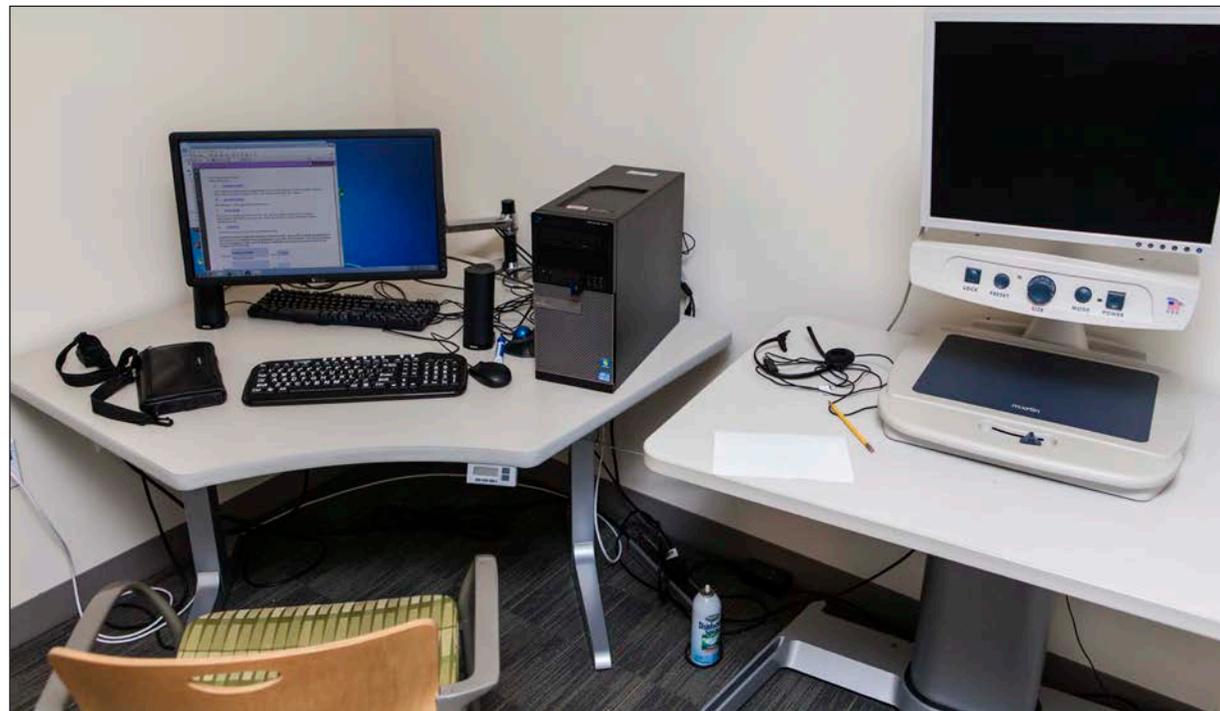
Quote

We have to clean nose prints off the monitors all the time because people want to use their vision so badly.

*– David Vasques
Center for Independent Living*

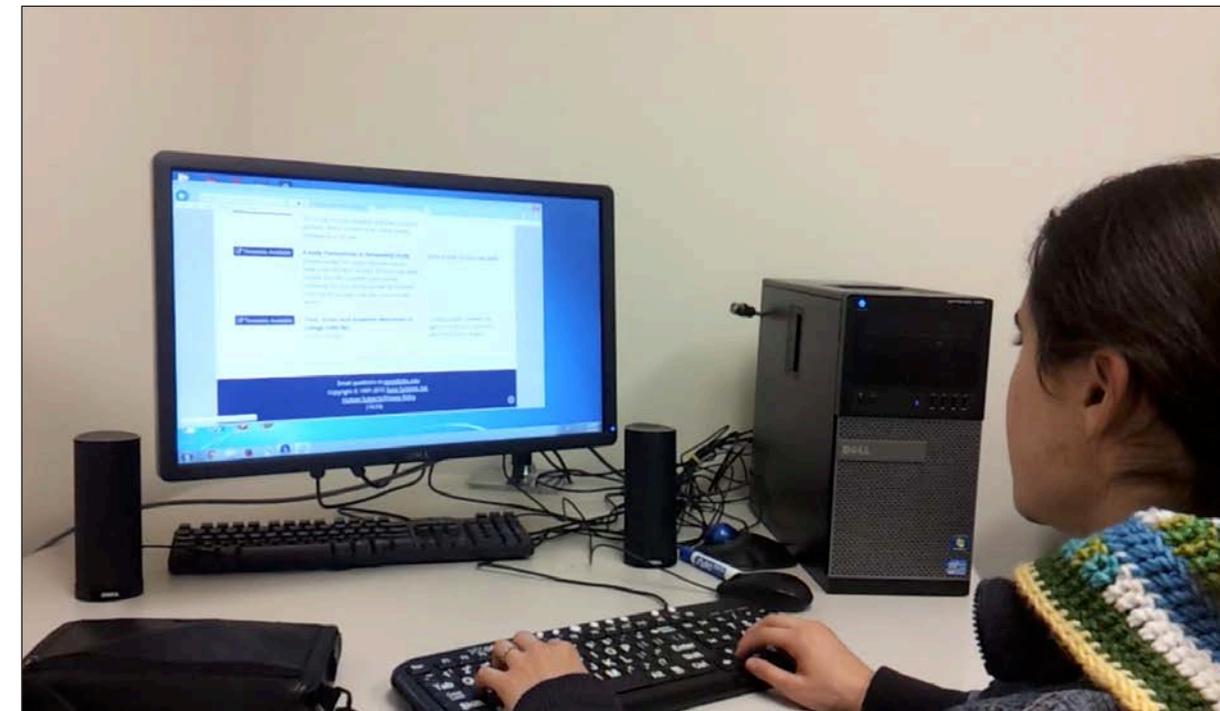
User Observations

SFSU Accessible Technology Commons (ATC) Work Station



- Right: document magnifying system
- Left: PC workstation

Sarah – Our Blind User



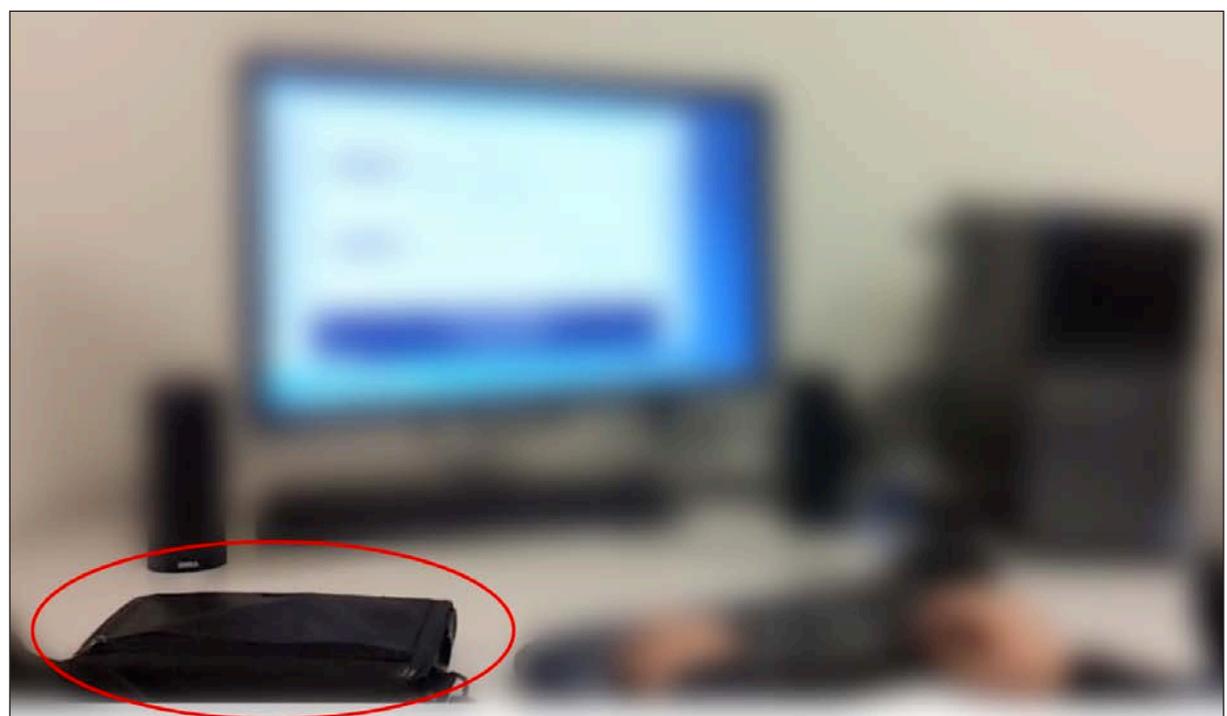
- Sarah working at a typical ATC workstation



User Observations

28

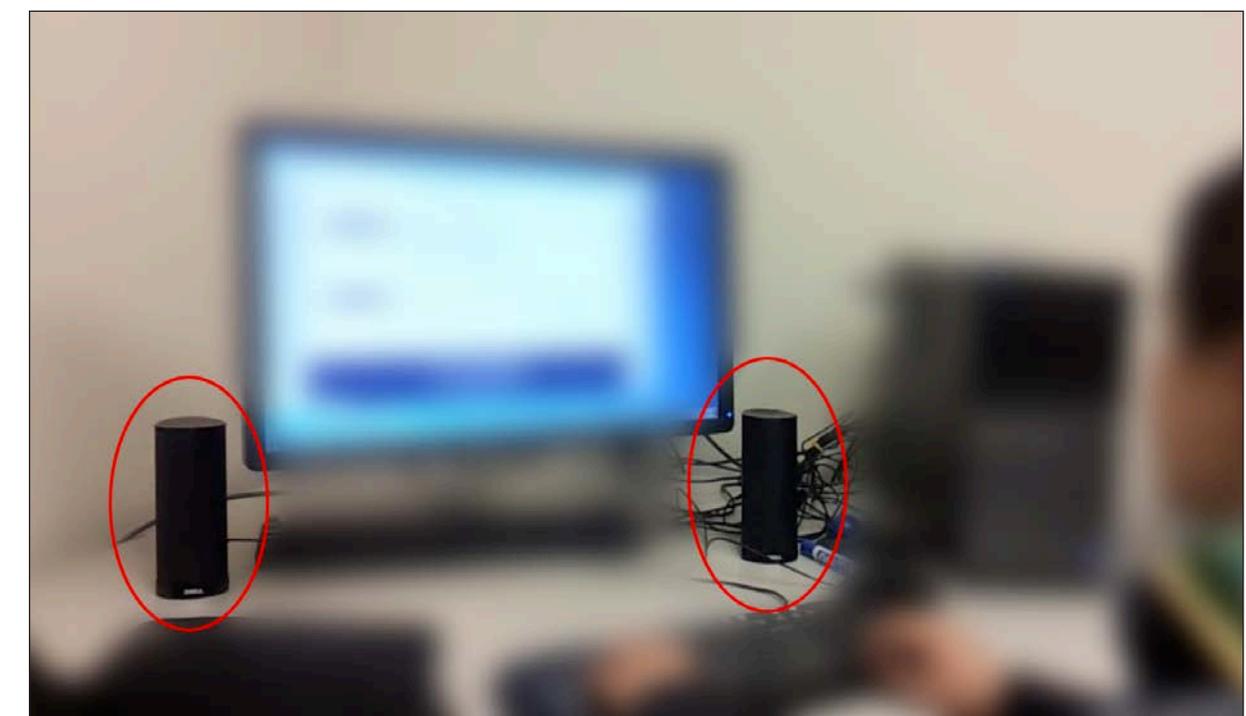
Screen Reader



- Sarah no longer bothers to bring her own laptop.
- Sarah prefers to simply bring her braille reader and use a school computer

29

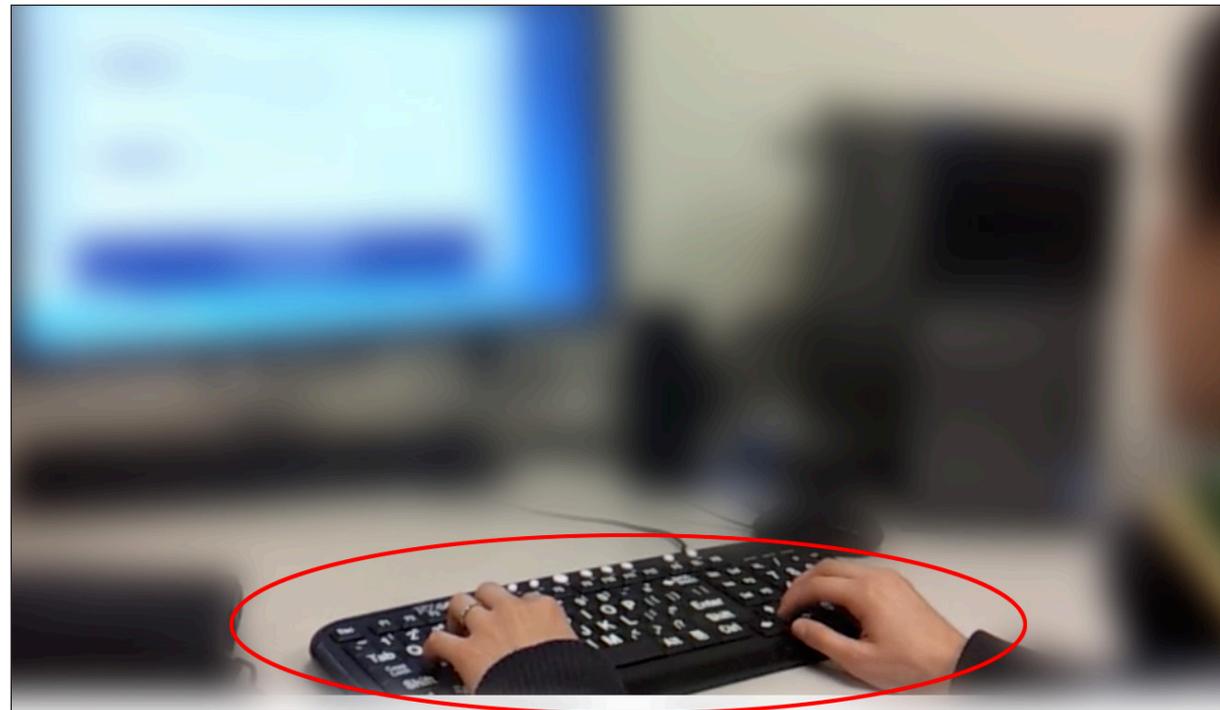
Speakers



- Sarah fussed with the speakers and the system volume for about 2 minutes to get the perfect volume.

User Observations

Keyboard



- Specialty keyboard outfitted with extra-large text for people with low vision

Mice



- The mice have not been used in sometime and were pushed aside out of the way of the user

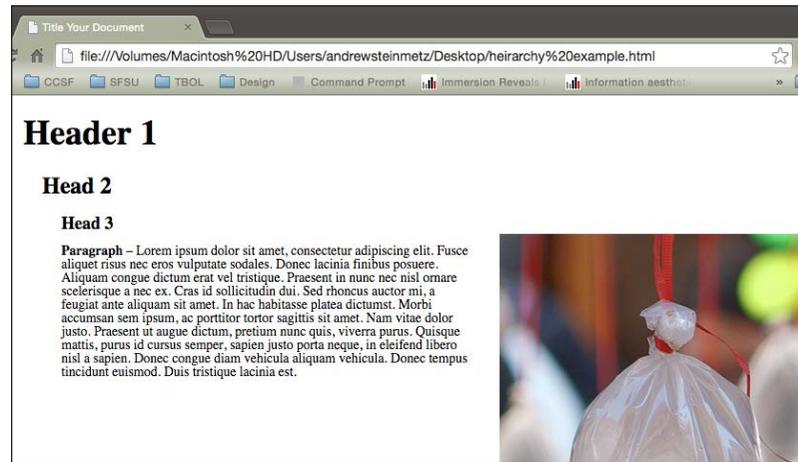
Observed Common Keys

Opening a List of Links



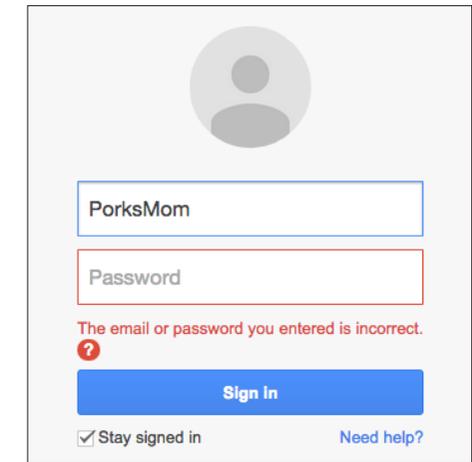
Research Insights

- As with fully sighted users, **there is no standard** for how blind or low vision users access a web site.
- There are **5 basic things** that can be done that will **greatly improve** a blind or low vision persons experience:
 - » **Well organized** page hierarchy
 - » **Test** your applications **with a screen reader** to ensure compatibility
 - » **Label form fields** and make sure the **tab sequence** is set properly
 - » Add **concise yet descriptive alt** text to all images
 - » Ensure **PDFs are accessible**



```
4 <meta charset="UTF-8">
5 <title>Title Your Document</title>
6 <style>
7 /*Reset...
32 h1 { font-size:36px; margin:24px 0; }
33 h2 { font-size:24px; margin:18px 0 18px 20px; }
34 h3 { font-size:18px; margin:14px 0 0 40px; }
35 p { font-size: 14px; margin:12px 12px 12px 40px; }
36 #container-page { width:850px; margin:0 auto; }
37 #container-page #content img { float:right; }
38 #container-page #content p { width: 430px; }
39 .fltlft { float:left; }
40 .fltrt { float:right; }
41 </style>
42 </head>
43 <body>
44 <div id="container-page">
45 <h1>Header 1</h1>
46 <h2>Head 2</h2>
47 <div id="content">
48 <h3>Head 3</h3>
49 <p class="fltlft"><strong>Paragraph</strong> &ndash; Lorem ipsum dolor sit amet, c
vel tristique. Praesent in nunc nec nisl ornare scelerisque a nec ex. Cras id sollicitudin du
tortor sagittis sit amet. Nam vitae dolor justo. Praesent ut augue dictum, pretium nunc quis,
vehicula aliquam vehicula. Donec tempus tincidunt euismod. Duis tristique lacinia est.</p>
```

- **Proximity** plays a huge roll **with alerts and error messages**
- **Multiple paths** for finding content increases the probability for **user success**
- **Simplicity in design** with very little clutter is not just good design, it **increases accessibility**
- As with fully sighted users, **pop-ups suck**
- **Auto-starting multimedia** on page load **can be confusing**
- **Automatic page refreshing** can be confusing and **may cause the screen reader to start over** from the beginning





Key Insight

*It is not the blind who are disadvantaged,
it is we--the unafflicted--as we have not
yet met our malady.*

*– Andrew Steinmetz
DAI SFSU*



Interpretation

Persona: Stacy



Personal Information

- Age:** 19
Occupation: Student
Major: Business Information Systems
Hobbies: Reading, singing, listening to music, learning foreign languages
Disability: Legally blind

Website Needs:

- Keyboard accessible
- Screen Reader Accessible
- Organized content
- Forms properly labelled
- Logically sequential form fields
- Images with descriptive alt text
- Accessible PDFs
- Content accessible in many different ways
- Searchable website
- Clean and simple design, no clutter
- Obvious when task completed

Scenario

Stacy needs to do some historical research on the development of Information Systems throughout the ages. She needs to be able to coherently explain in class in lay-terms what led to modern Business Information Systems and why their current hierarchical structures evolved.

She decided the fastest way for her to grab the largest amount of information on the topic was to use her school's online article database interface. She has always liked her school's website because it is very easy for her to use and everything is always properly labelled. She quickly logged in and found the Business Information Systems database which seems to be the correct one for her topic.

After logging in to the BIS database she was stumped. It took her several minutes to figure out the layout of the landing page. The page had a short blurb of content at the very top. She guessed it was at the top because it was the first thing presented to her. Then there was a long link-list that served as the navigation menu.

There appeared to be nothing else on the page except for some graphic. So she listened to the menu again and selected one that seemed to be relevant. Again, there seemed to be no content on this page except for another graphic.

Because the graphic had no alternative text description, she assumed this graphic was simply a logo. It turns out this graphic was a button that would have taken Stacy to the database search form.



Design Drivers

Quote

1 Organized
Good, clean hierarchical organization is perhaps the most important step in making websites accessible to the blind.

2 Screenreader Compatible
Screenreader crashes and incompatibility are the number one issues blind users have when browsing the web.

3 Forms
Poorly designed forms prevent the blind from accomplishing tasks ranging from asking a question to buying goods.

4 Images
Photographs and graphics images need to have a meaningful description for the blind to understand what they are describing.

5 Accessible PDFs
Scanned pages turned into a PDF have no meaning or value for the blind.

6 Error Messaging
Proximity is key for people with low vision, and for the blind the errors should take focus so reader announces it immediately.

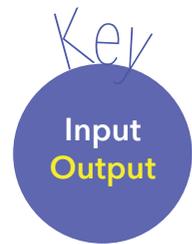
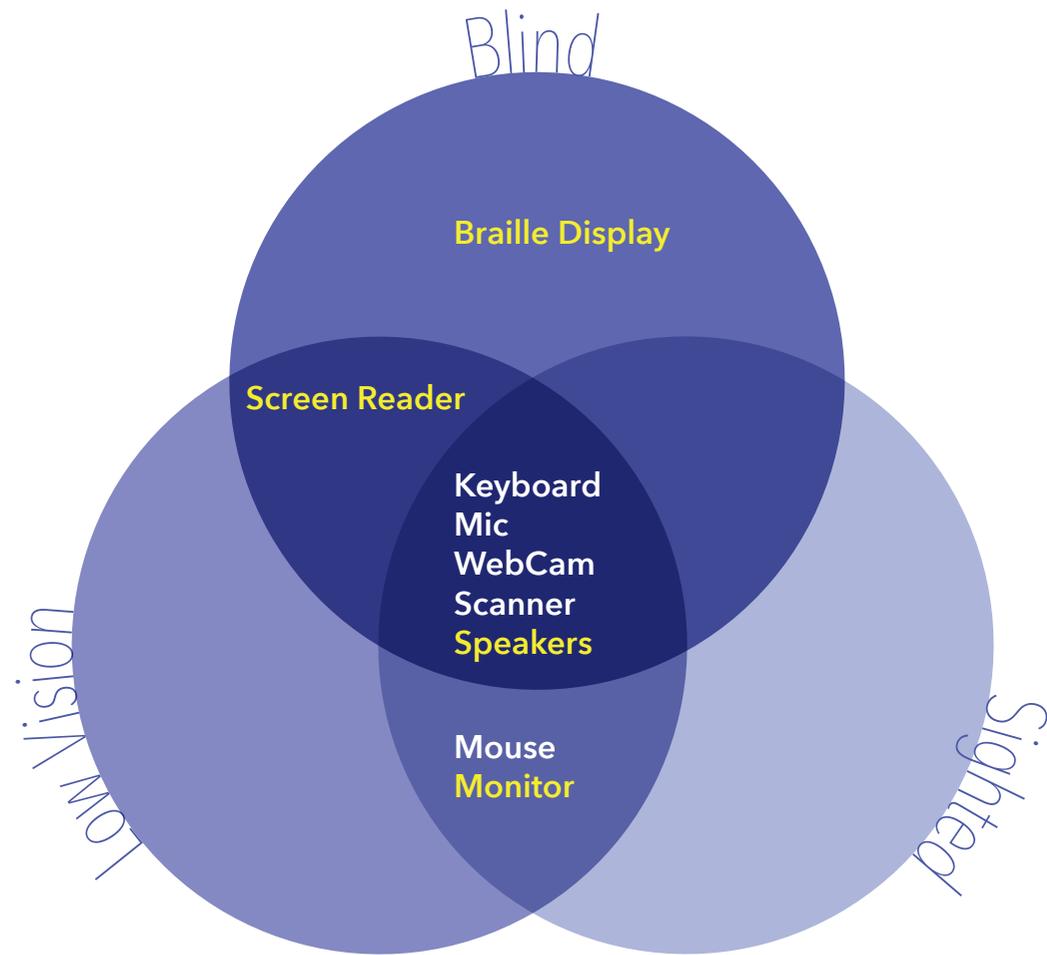
7 Multiple Paths
There should always be at least two ways to any content or goal. This increases the probability of success for the blind.

8 No Automatics
Pop-ups, auto-refresh, and auto-play media cause confusion and frustration for the blind.

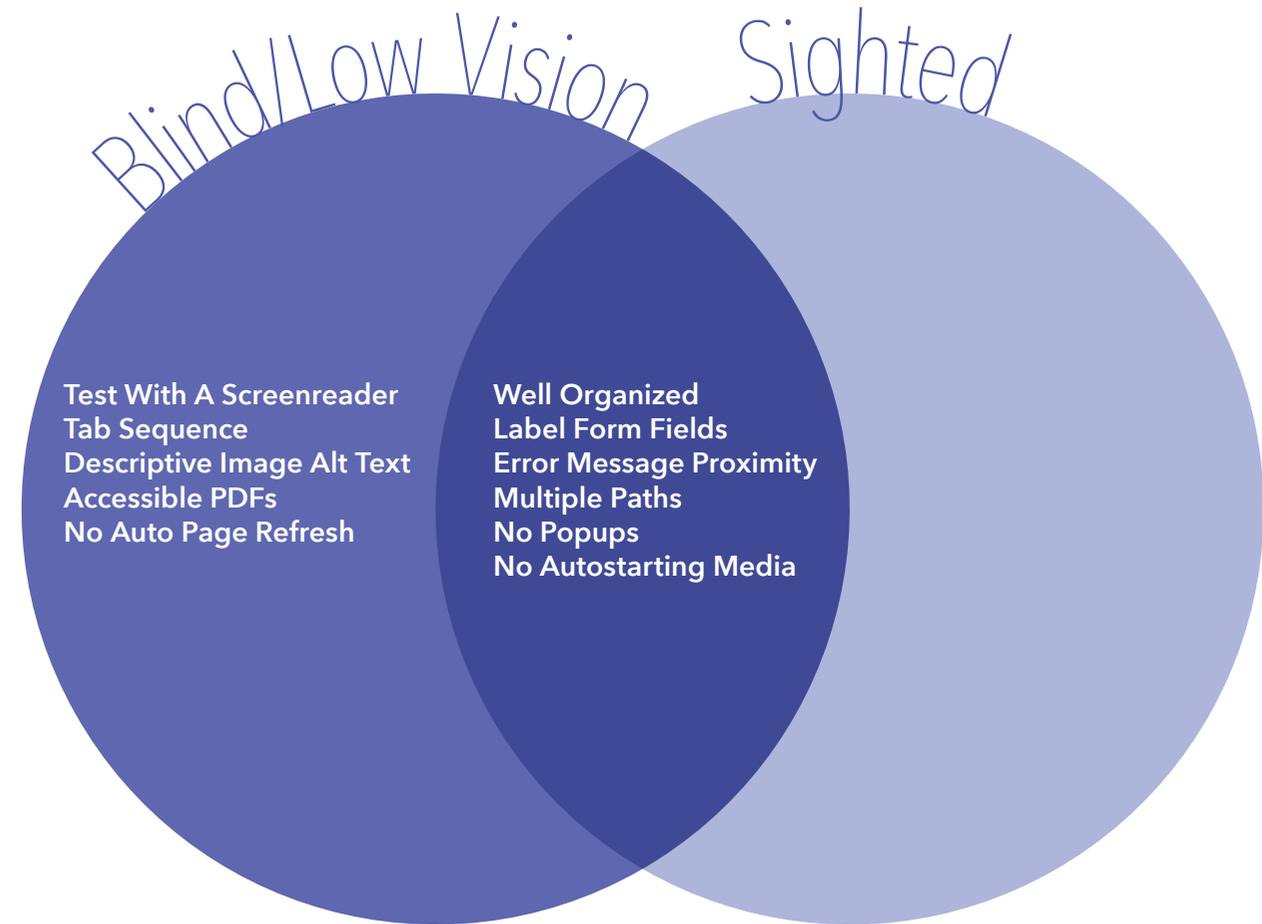
... Designers understand the power of limits. Constraint offers an unparalleled opportunity for growth and innovation.

*– Scott Dadich,
Creative Director, WIRED*

Venn Input / Output



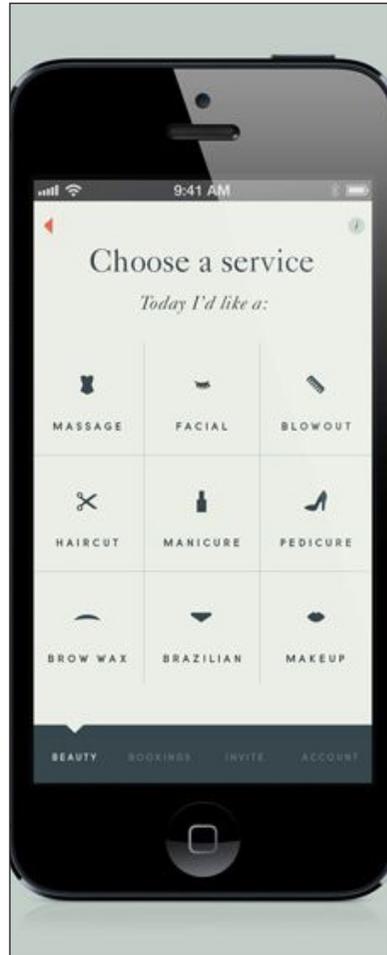
Venn Usability





Ideation

Influence Mapping





Possible Solutions

Education

- Re-design design books so accessibility is the first thing discussed
- Create a class on accessibility in design
- Restructure education in departments across university so that accessibility training is mandatory
- WWW ad campaign
- PSAs – radio TV internet
- Talk show discussions
- Guerilla marking
- Awareness campaigns – Read to the blind day
Day of civic action whereby the sighted assist the blind in some action
- Blind simulations
Turn monitors off day

Implementation

- Clean simple design
- Hierarchical structure
- Multiple paths to any node
- Searchable
- Navigation – very general to very specific
- Unique figure/ground patterns through negative space for each channel
- Version of site specifically for the blind
Becomes linear like mobile version
- Build site that it is only keyboard navigable, mouse doesn't work
- Turn on/off site refresh [Also Tech]
- Strong Government regulations requiring accessibility [Also Ed]
- Tax incentives encouraging accessibility [Also Ed]
- Standardized QA process

Technology

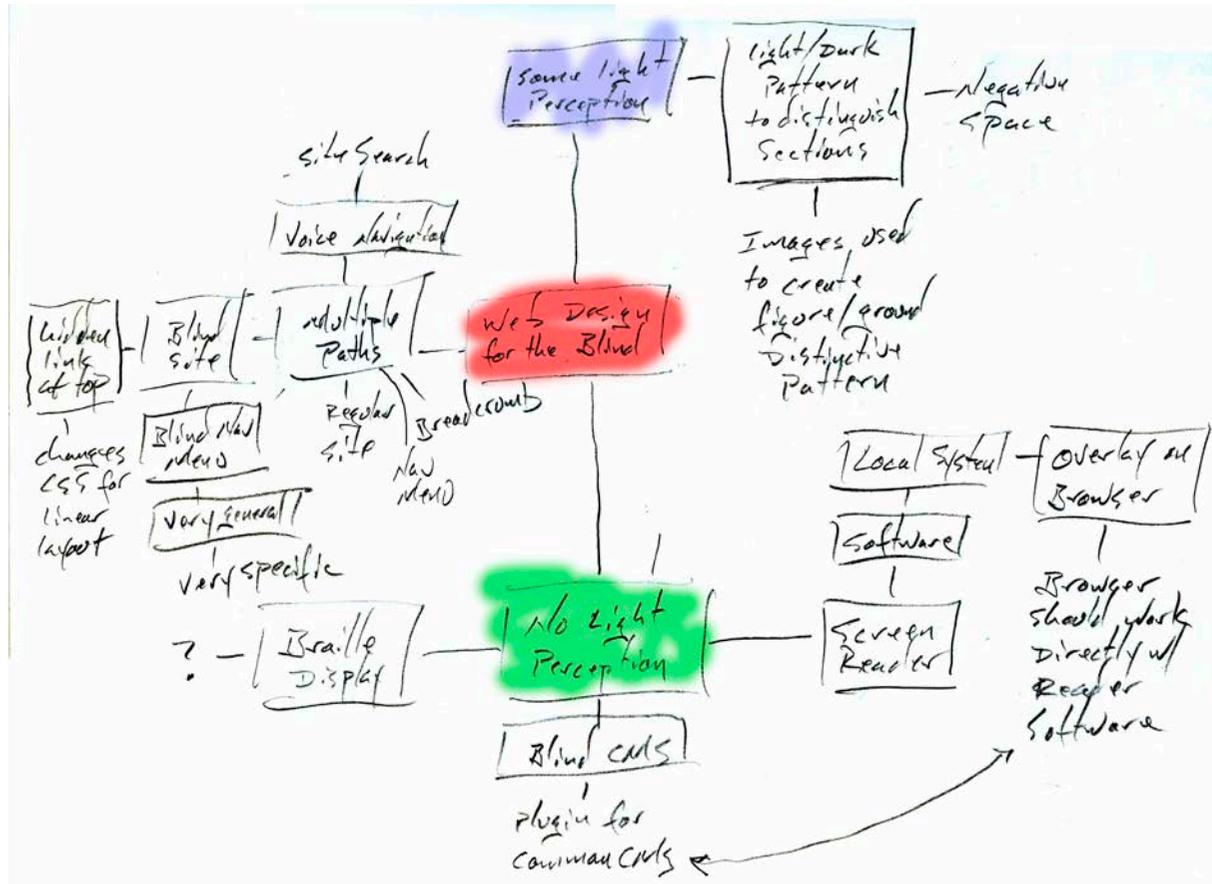
- Accessibility assessment tools built into popular IDEs
- CMS specifically for Accessibility
- Accessibility plug-in for popular CMS
- Web pages as Objects.
As with OOP, web pages should be built as objects that are aware of their own functions. That is, a form should know it's a form, and work with a screen reader or braille display
- Create Screen Reader object in upcoming DOM Level 4 release that tells screen readers what objects are rather than relying on screen readers to interpret the object
- Voice command accessible
- Create common keystrokes for site specific navigation, e.g. Cmd + Opt + H takes a user to the home page
- Screen reader / Braille Display detection
- Content as objects handled by CMS and placed organically into ontological structure based on topic
- Server level mandatory accessibility testing before publishing can occur
- Day of Civic Hacking topic
- Automatically OCR PDFs with scanned pages
- SIRI style interaction with website where you are asked what you would like to accomplish

Possible Solutions

Light Perception

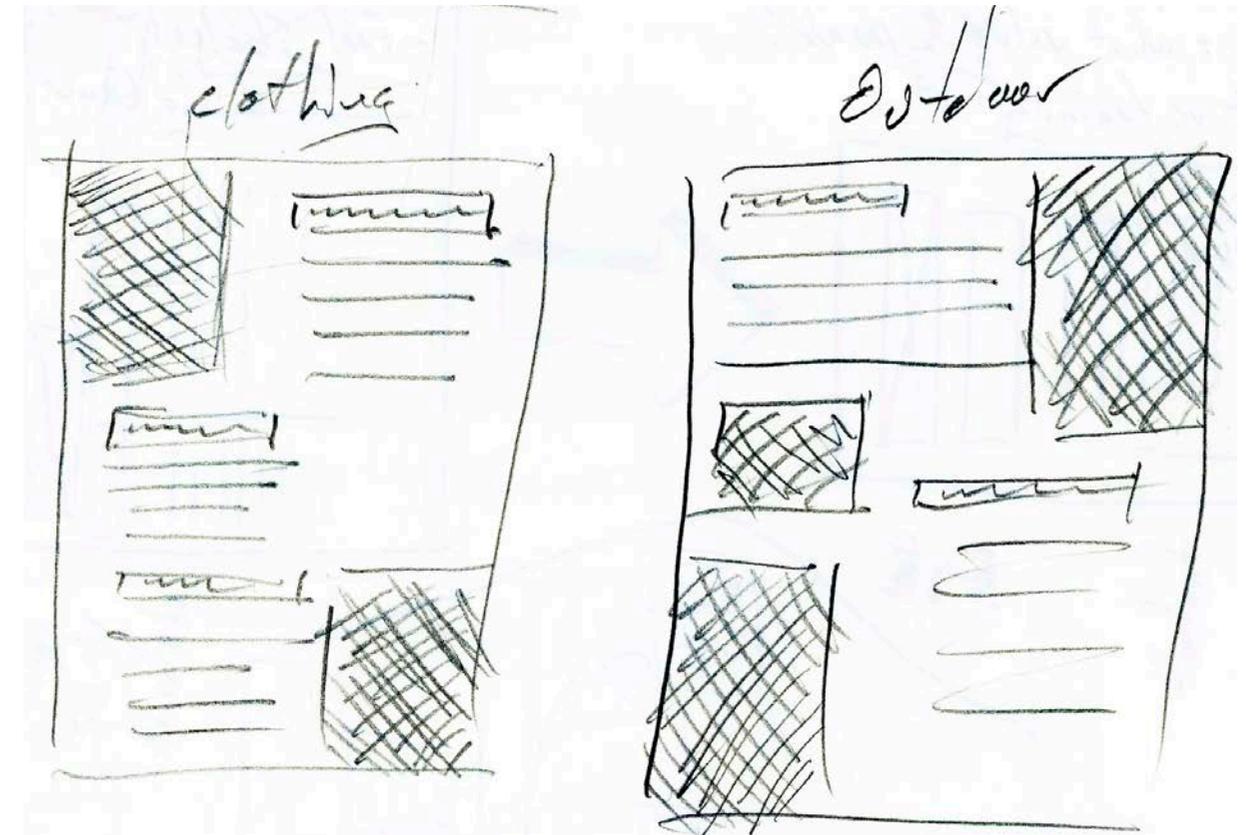
Two Basic Users:

- Some amount of light / dark perception
- No light perception



Light Perception - Figure Ground

For users with some light perception, assist in wayfinding by creating unique to section figure / ground patterns

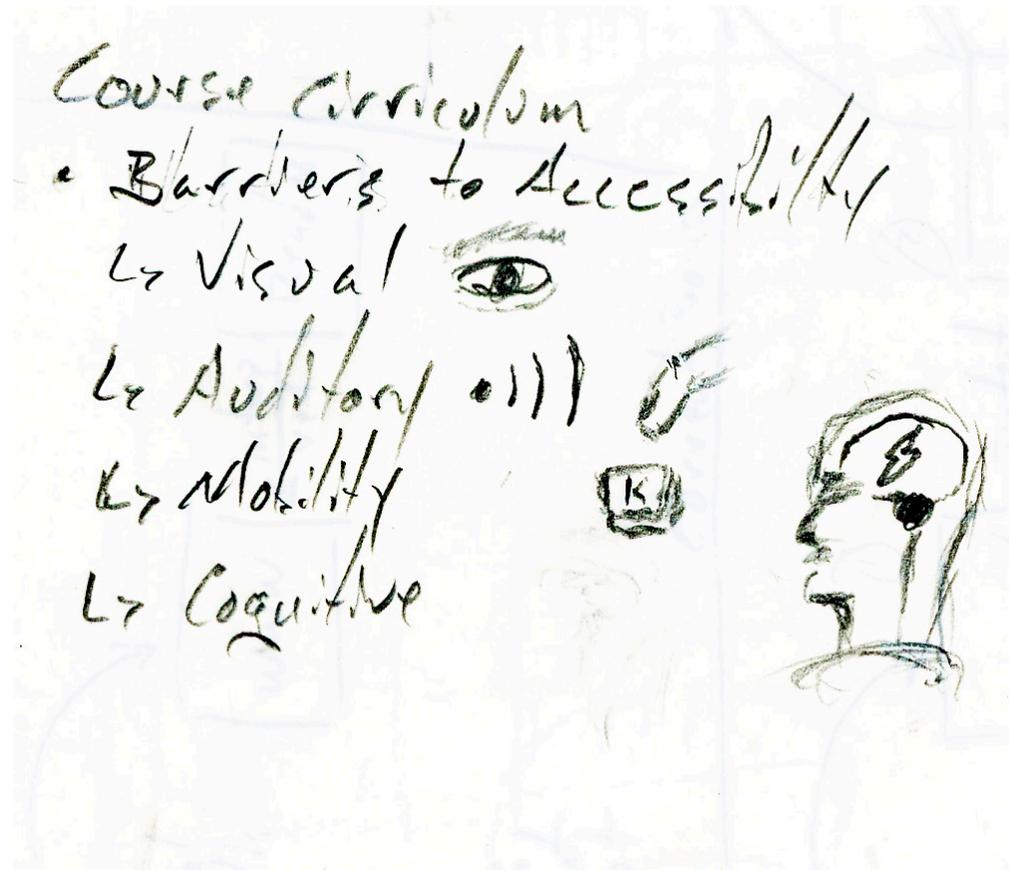


Possible Solutions

Education – Course Curriculum

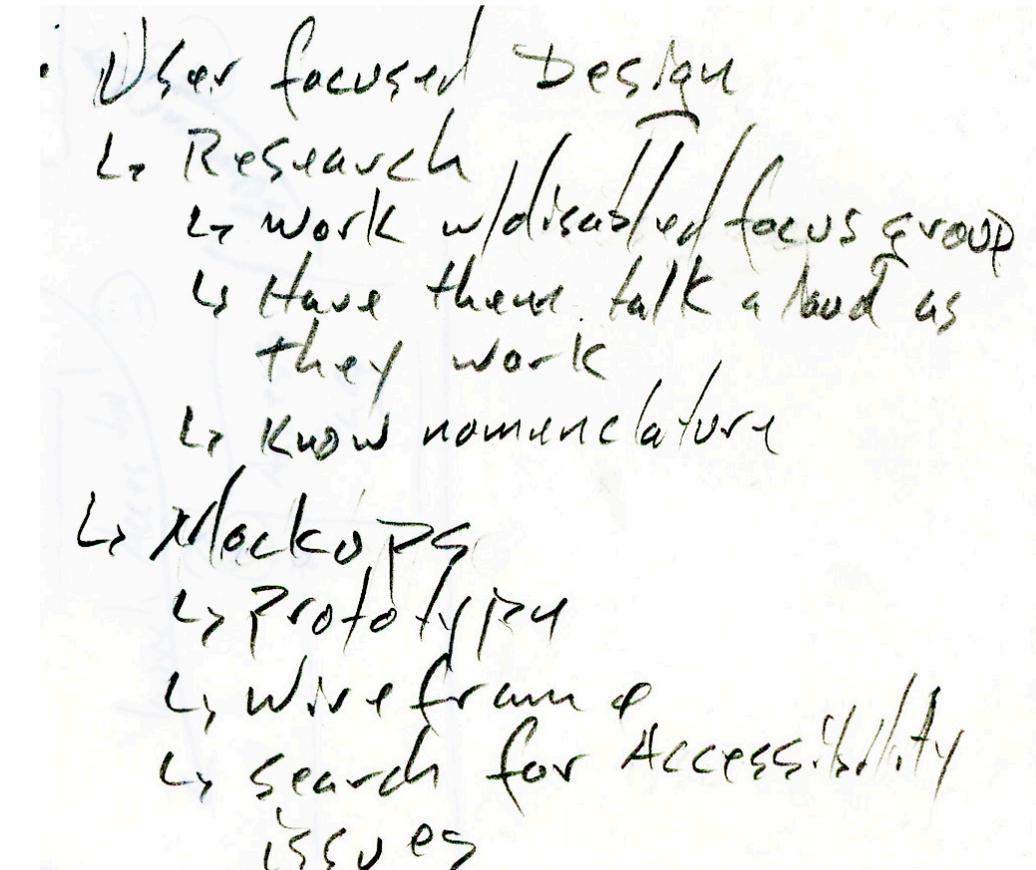
Begin with outlining basic barriers to web navigation:

- Visual
- Auditory
- Mobility
- Cognitive



Education – Course Curriculum

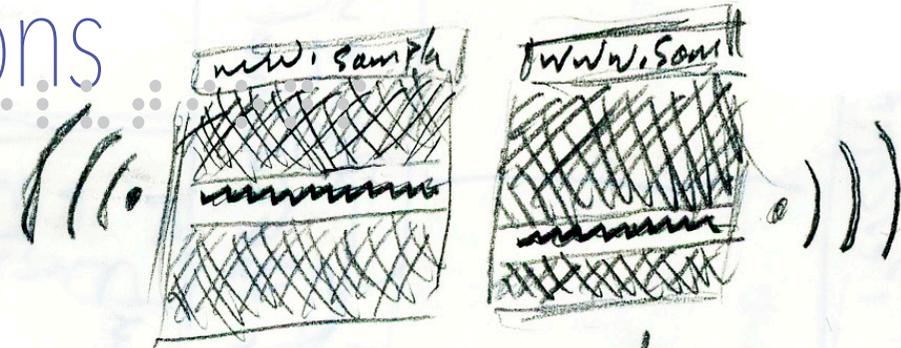
Then move into User focused design techniques.



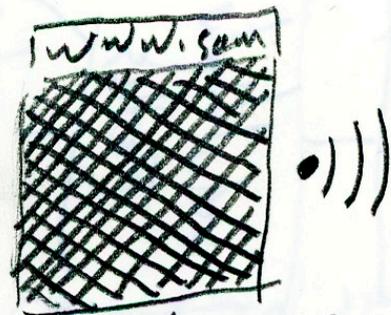
Possible Solutions

Education - Ad Campaigns

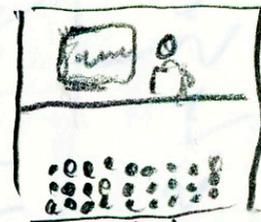
- Show webpage
- Blur text
- Fade in screenreader as text blurs
- Horizontal split screen blurred text top, braille display bottom.
- Show stats on the number of people with disabilities in US alone.



Black page w/ one line of text of text



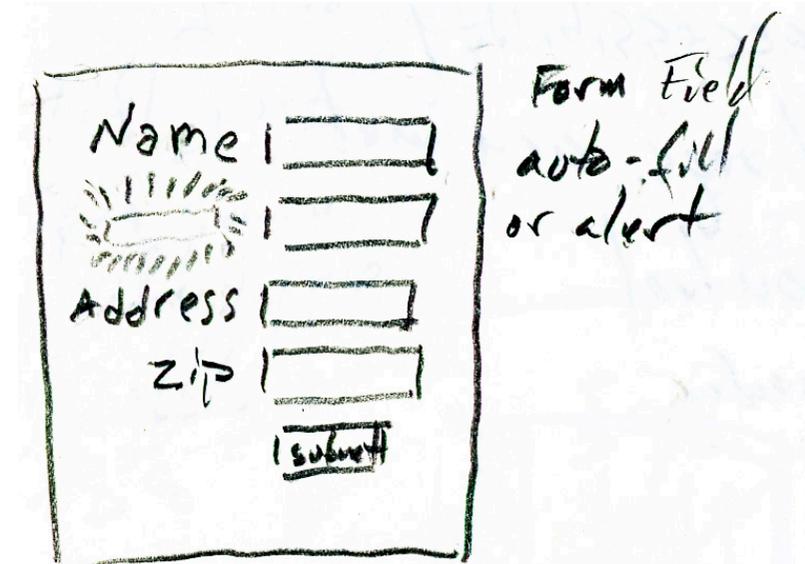
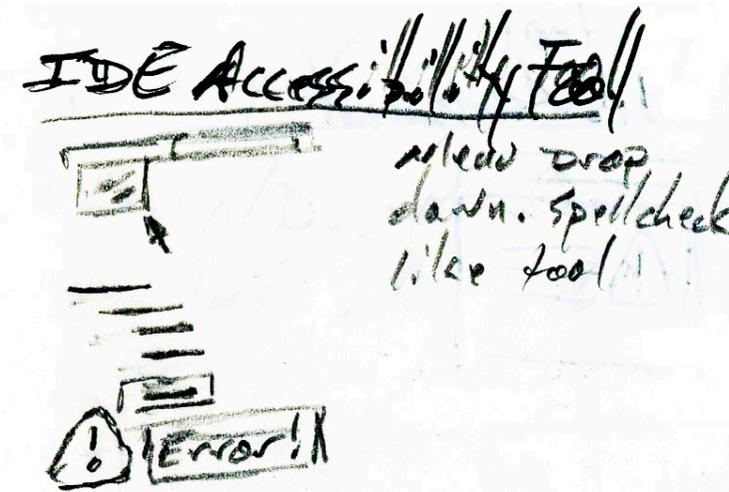
Black page spoken content



Split screen showing Braille reader vs actual screen

Cross System Accessment Tool

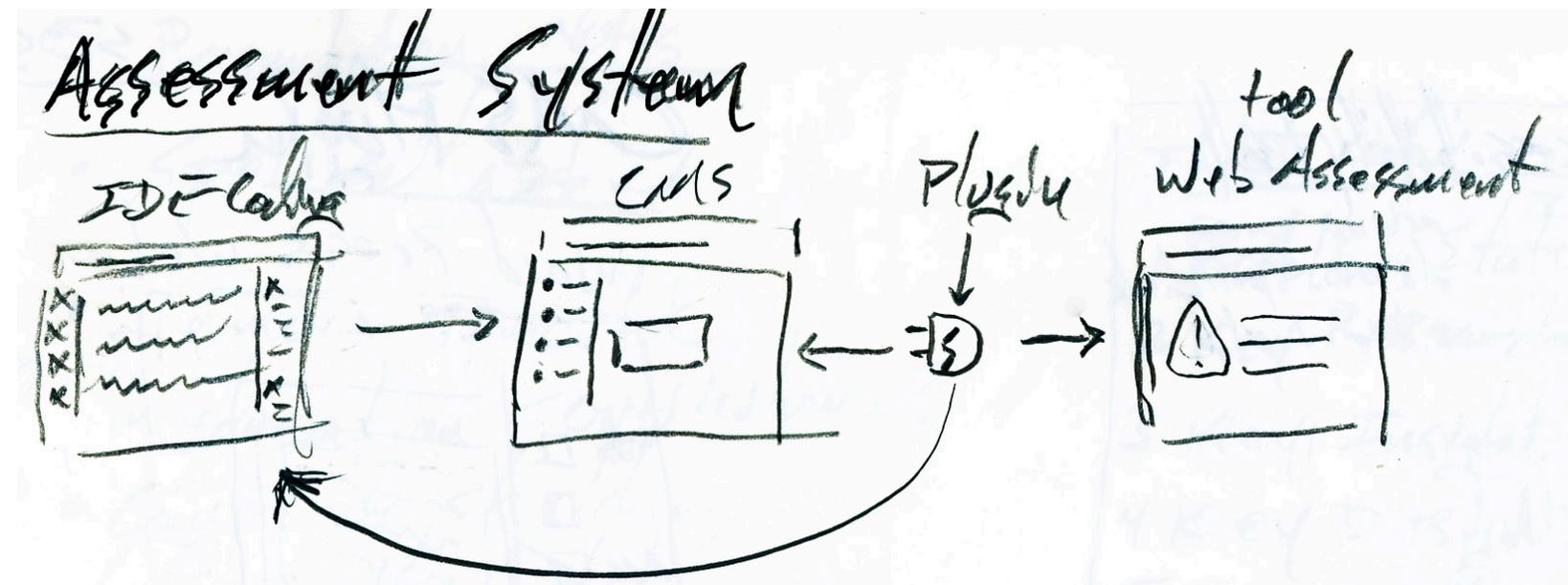
- IDE Accessibility tool is a free plugin that you load into your favorite development environment



Possible Solutions

Cross System Accessment Tool - Plugin

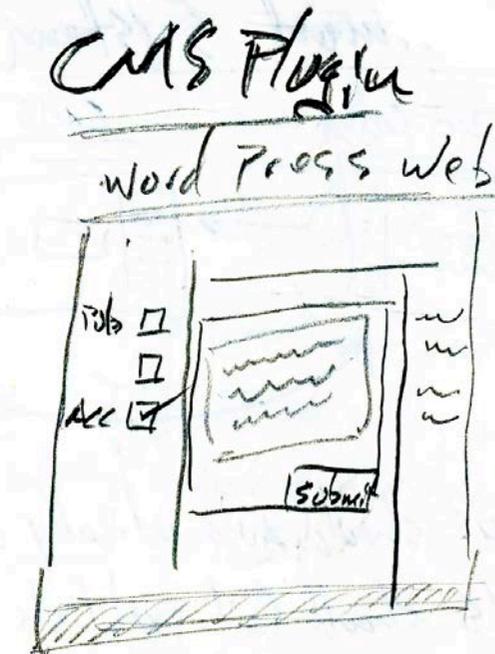
- Integrated Development Environment (IDE), e.g. Eclipse or Dreamweaver
- Content Management System (CMS)
- Web-Based Accessibility Assessment Tool (WAAT)



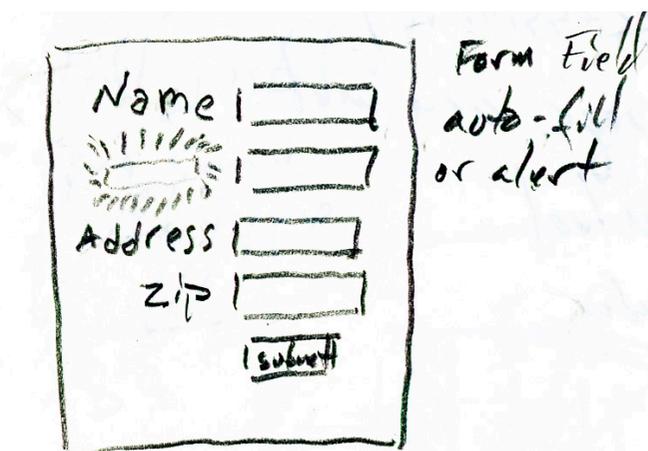
62

Web Server Based

- CMS version is a simple check box that verifies code and content for accessibility before publishing.



- Server-Side script or "app" runs through code checking for missing attributes, e.g. form field missing a label.

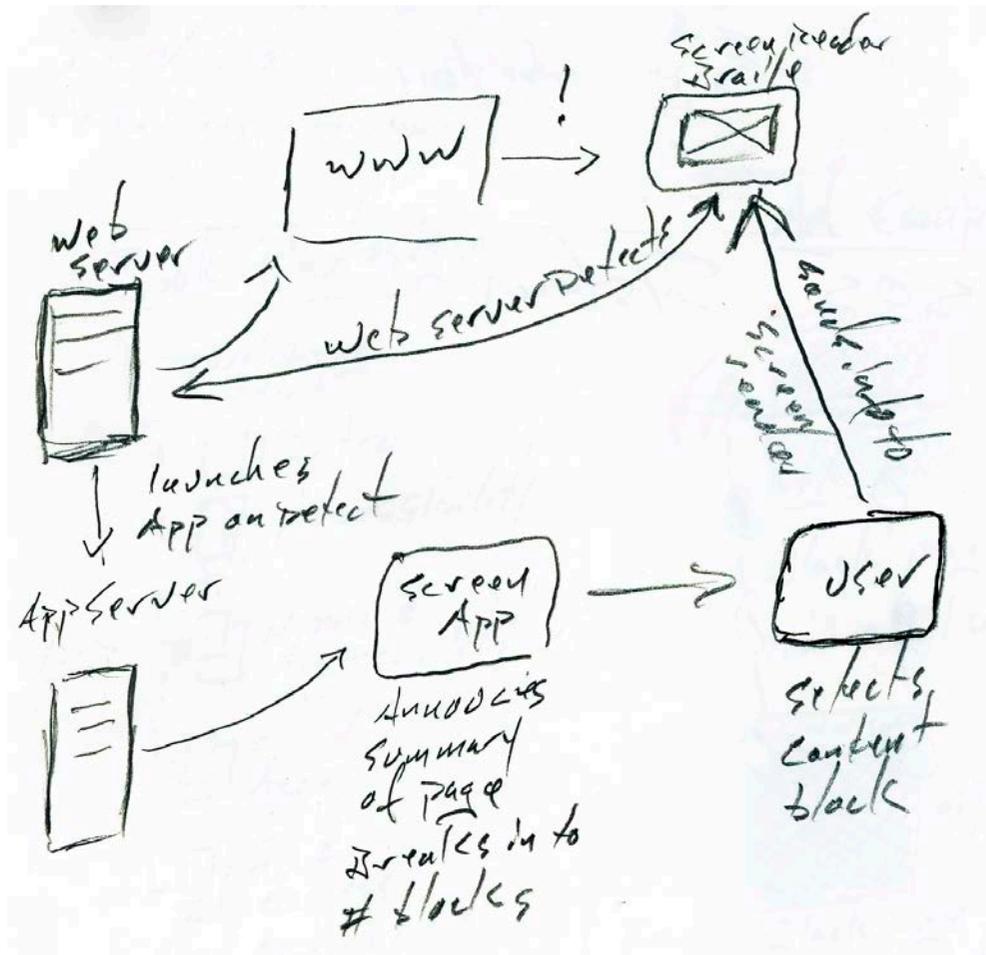


63

Possible Solutions

Web-Based Accessibility Solution

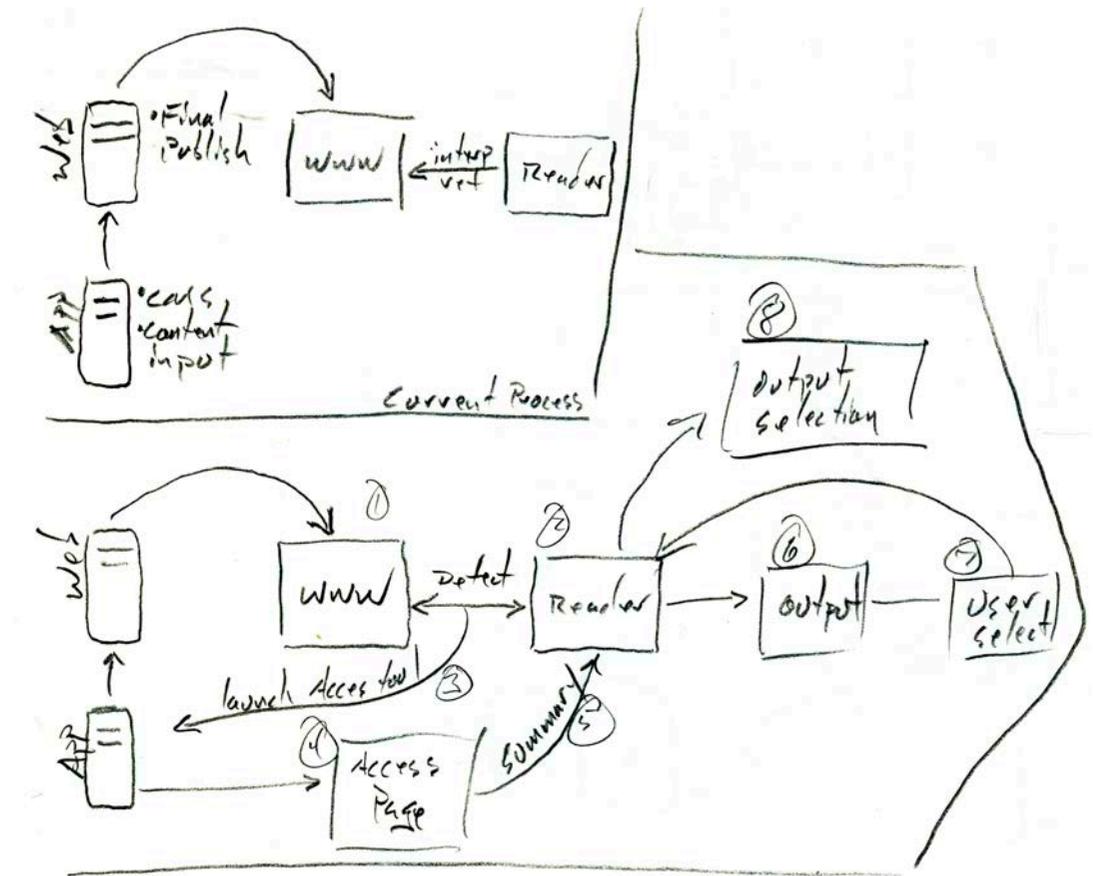
- All items on web pages now defined as objects
- For example form object is aware that is a form and of the fields inside of it.
- Web server detects active screenreader launches server-side app
- App Server begins feeding screen reader information removing interpretation and replacing with description



64

Web-Based Accessibility Solution

- Example of current process vs. integrated system

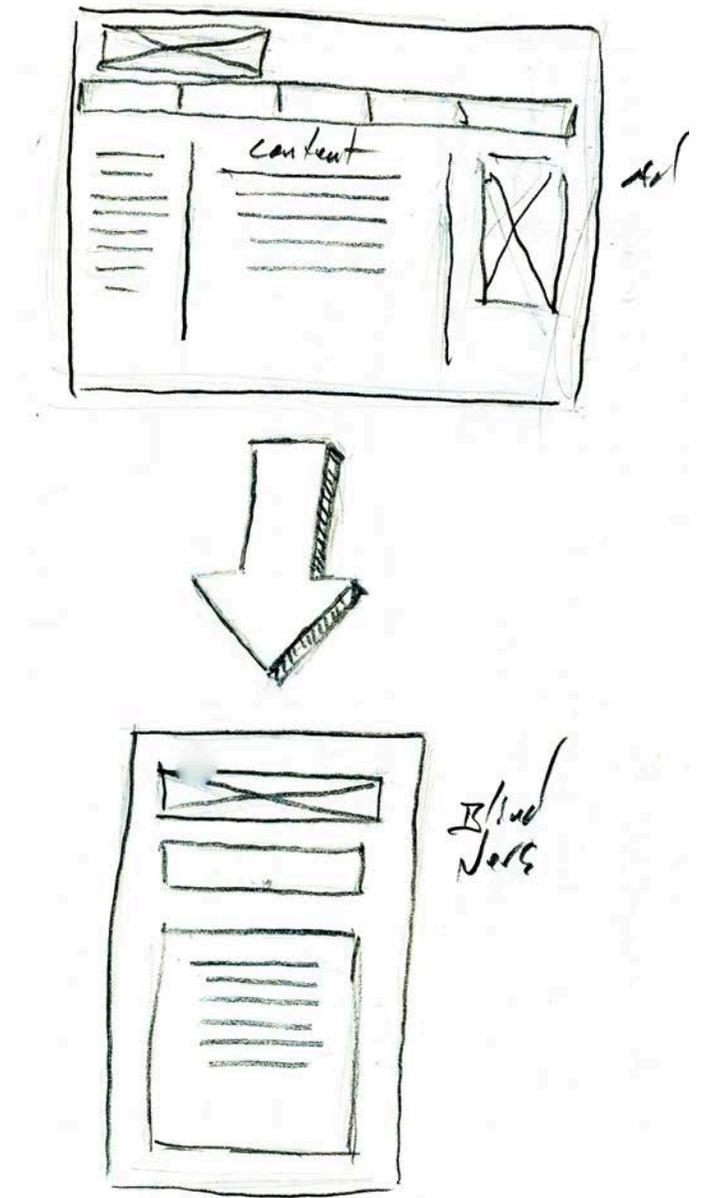


65

Possible Solutions

Web-Based Stylesheet (CSS) Solution

- Simplest fix
- Have hidden, screenreader accessible link next to logo
- Blind / Low Vision users taken to simplified version of site

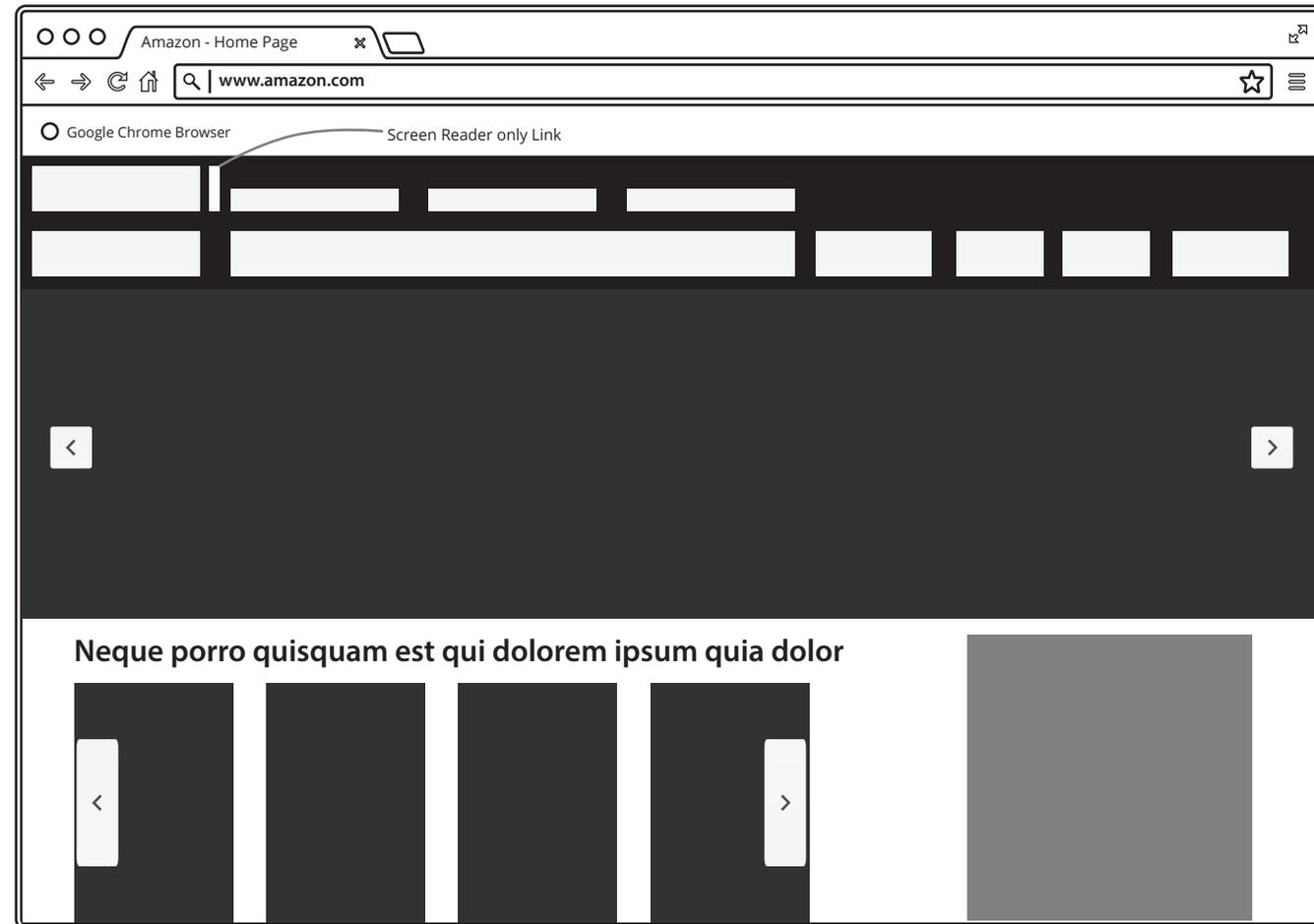




Experimentation

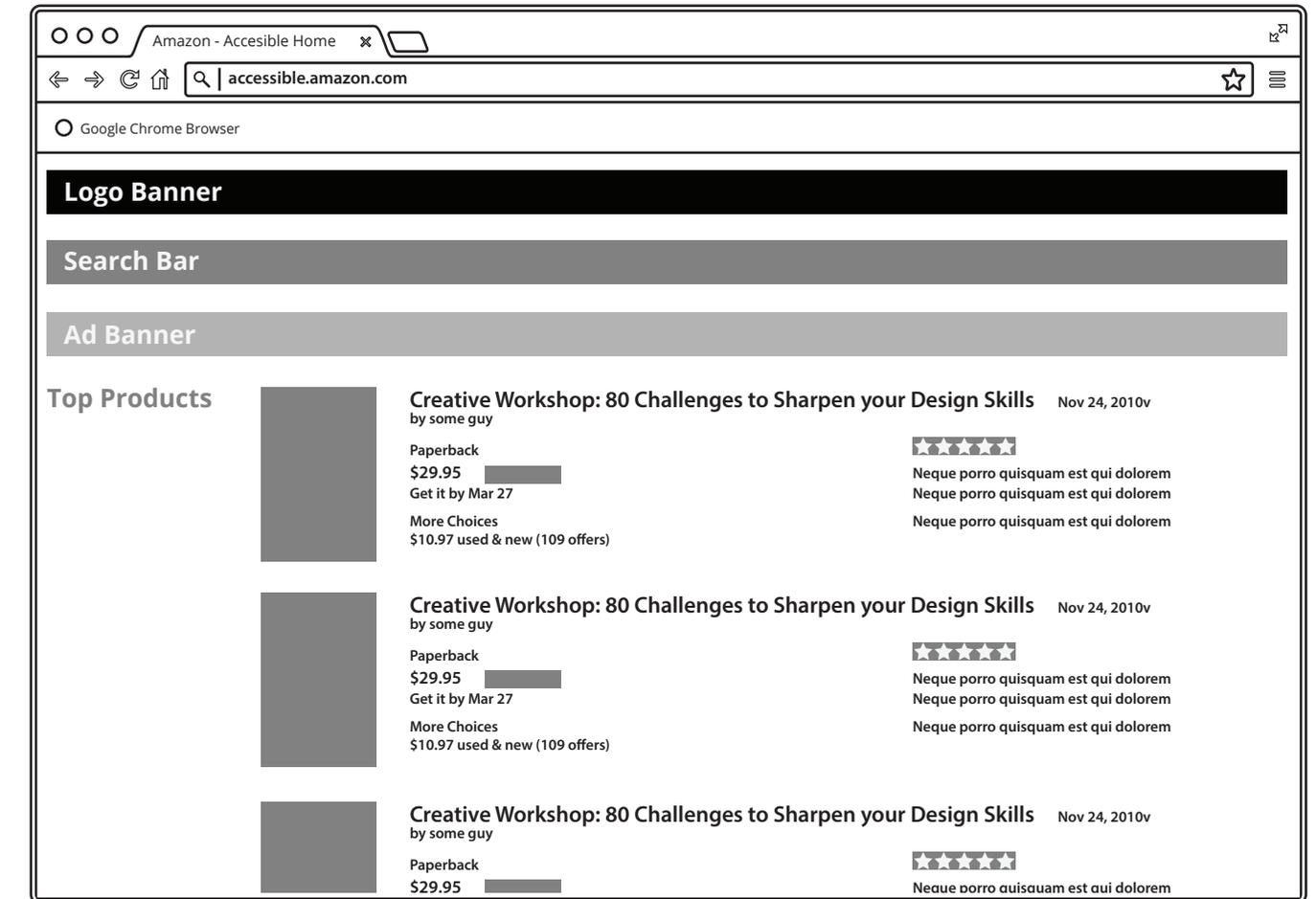
CSS Based Clutter Reduction - Wireframe

Amazon Home Page



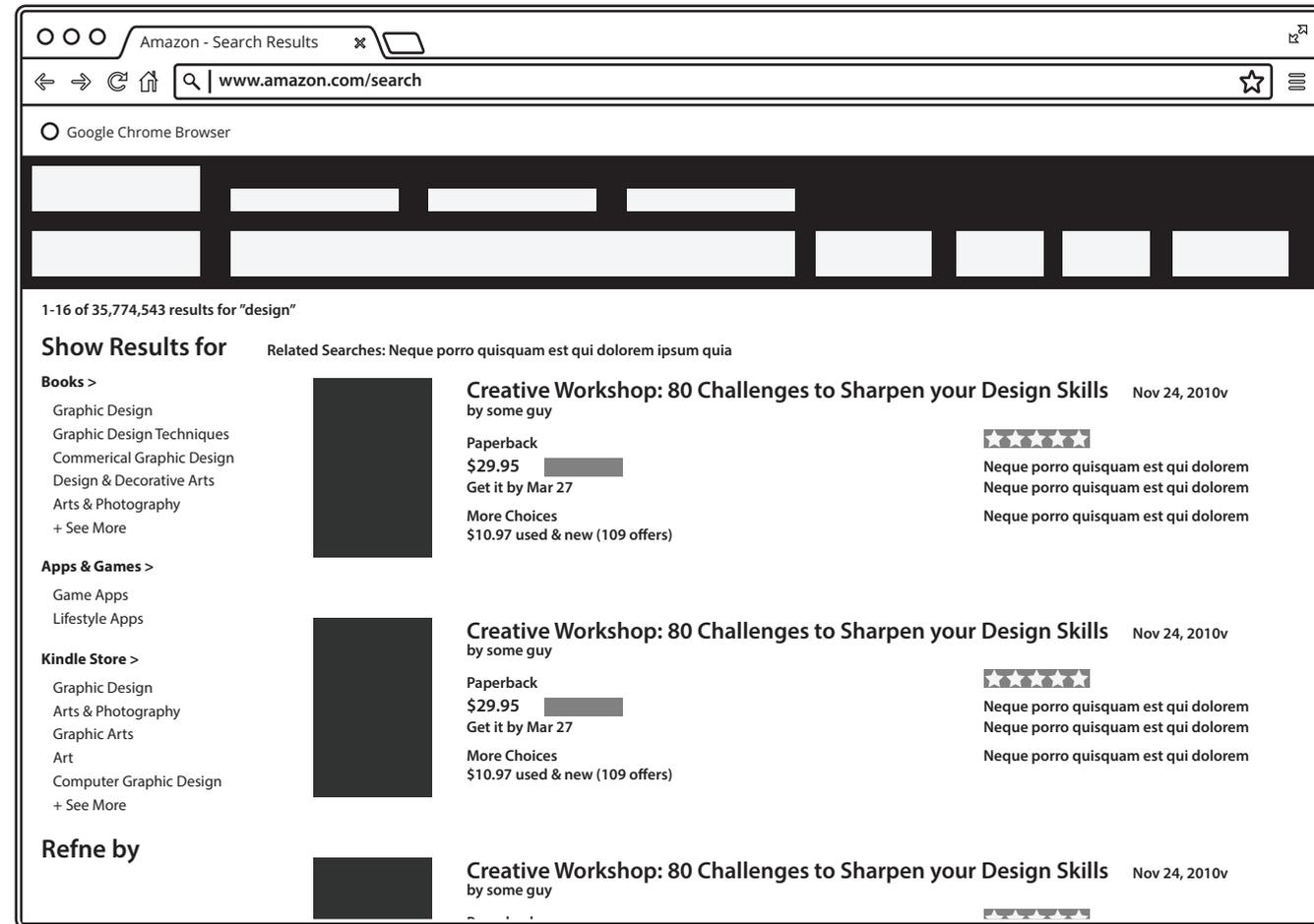
CSS Based Clutter Reduction - Wireframe

Accessible Amazon Home Page



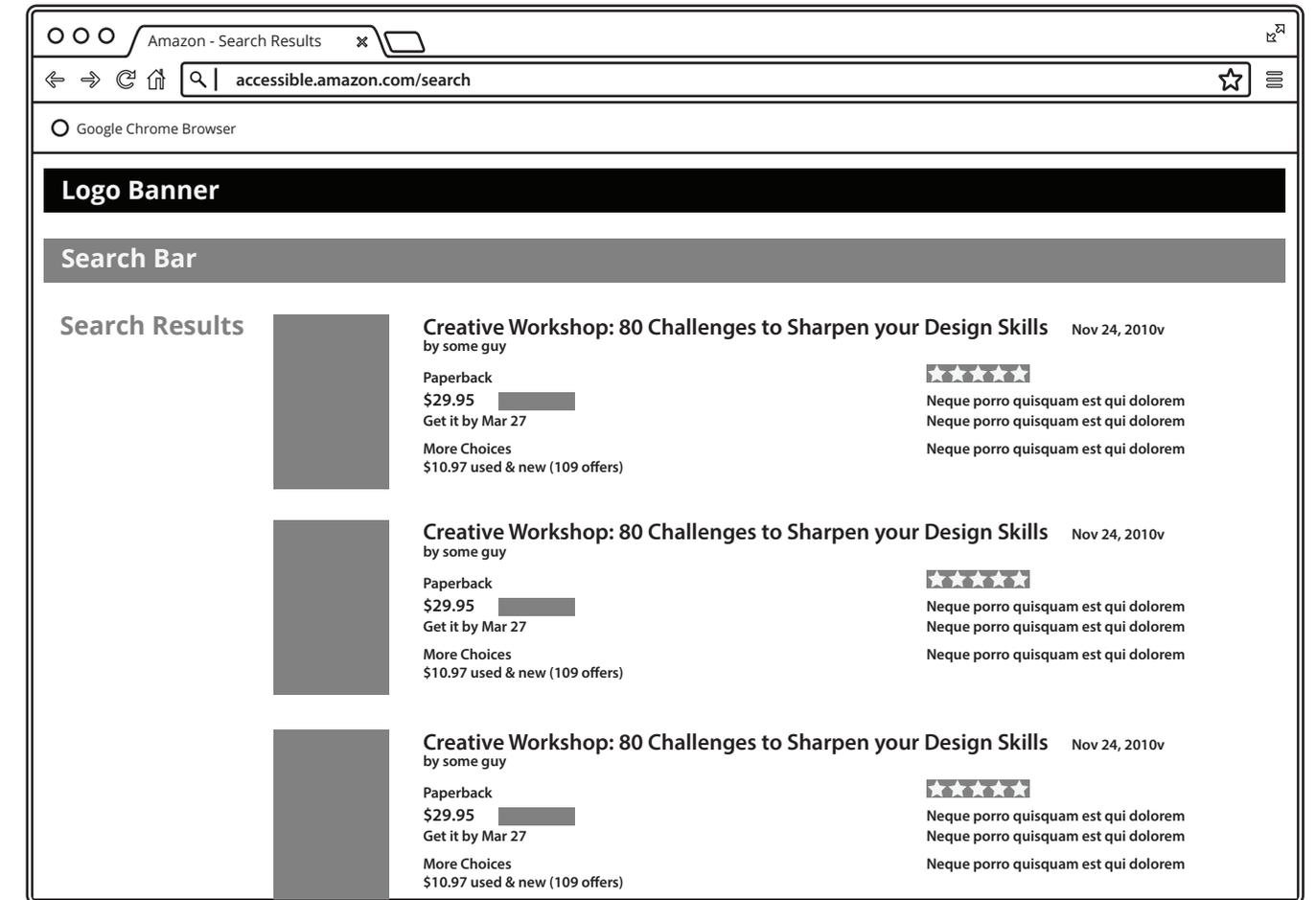
CSS Based Clutter Reduction - Wireframe

Amazon Search



CSS Based Clutter Reduction - Wireframe

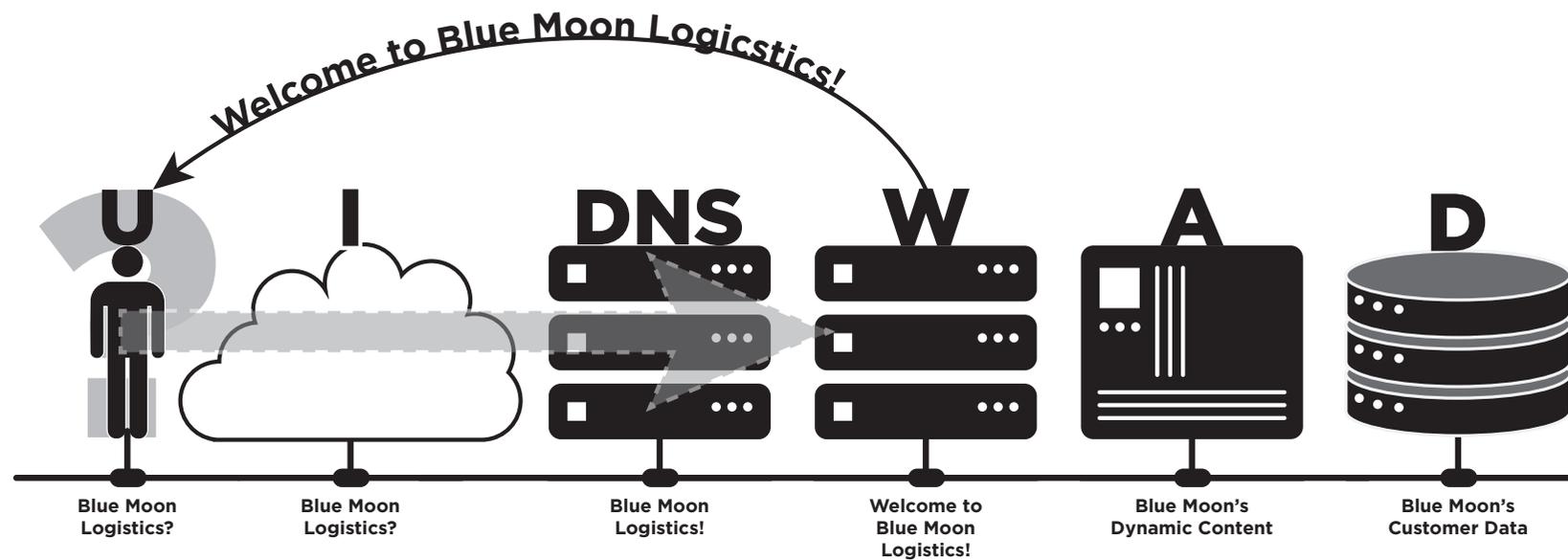
Accessible Amazon Search



Solutions

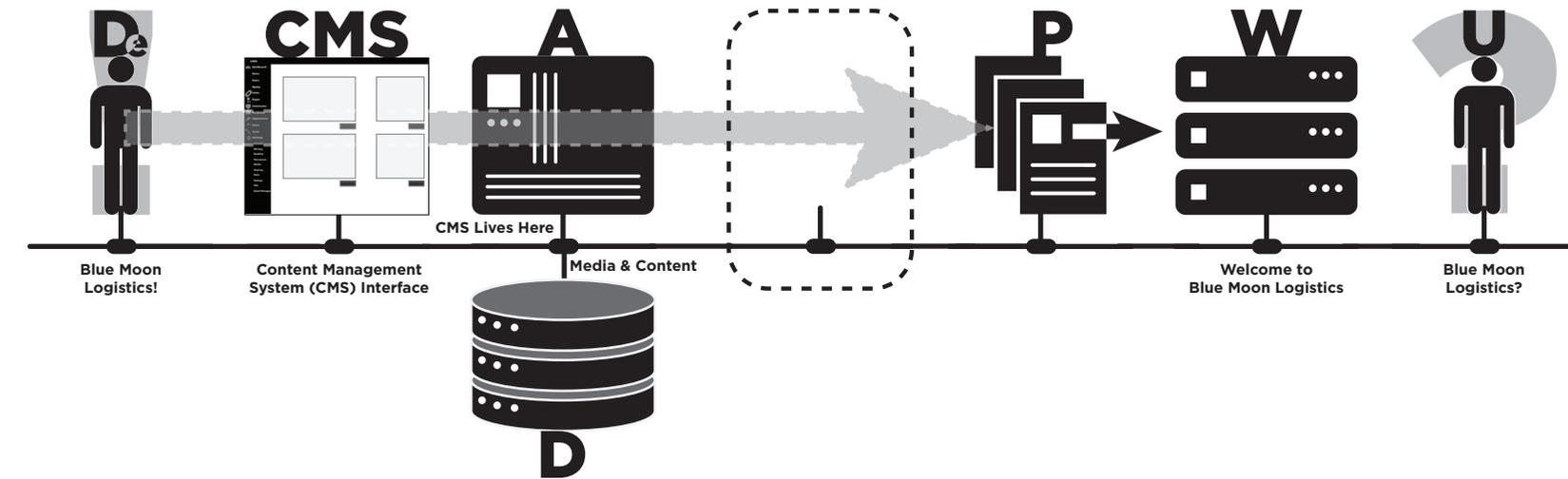
Web Browsing Flow

74



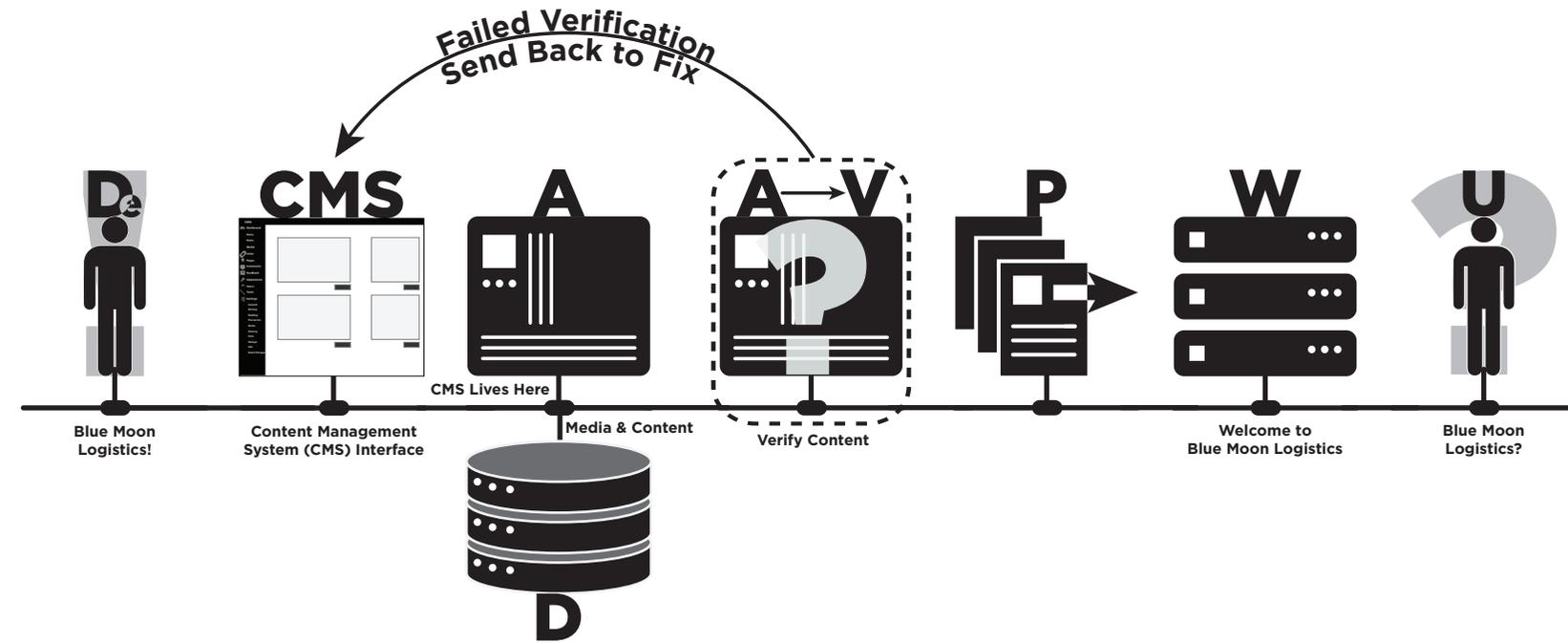
Gap in Web Design

75



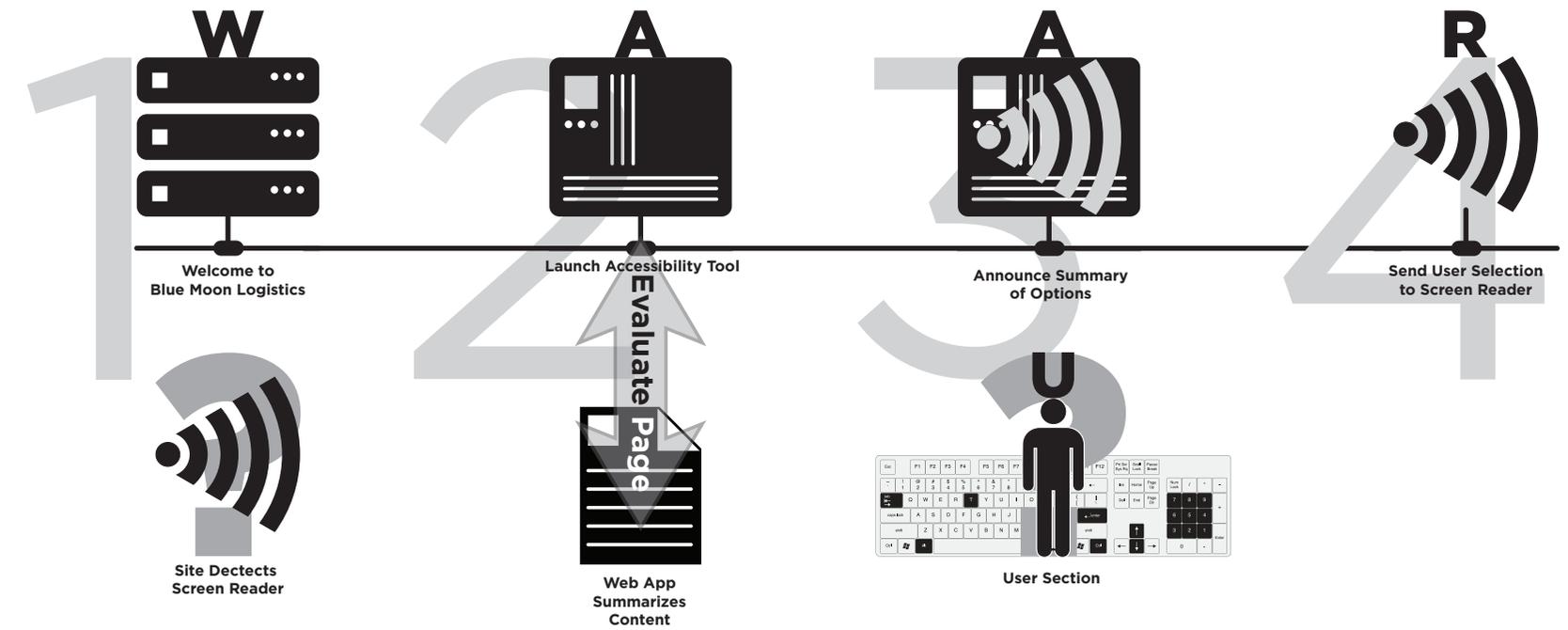
Solutions

Publishing Verification



76

"Self-Aware" Web



77

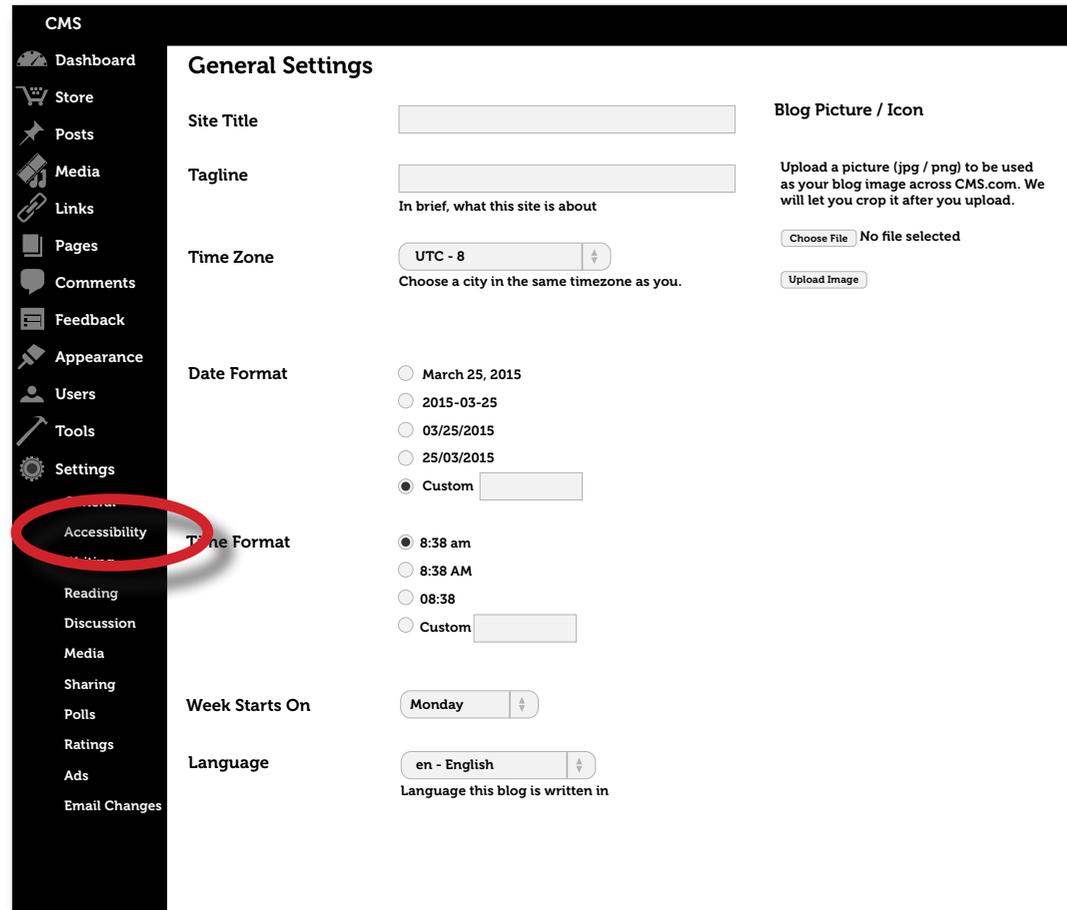


Evolution

Designer Interface

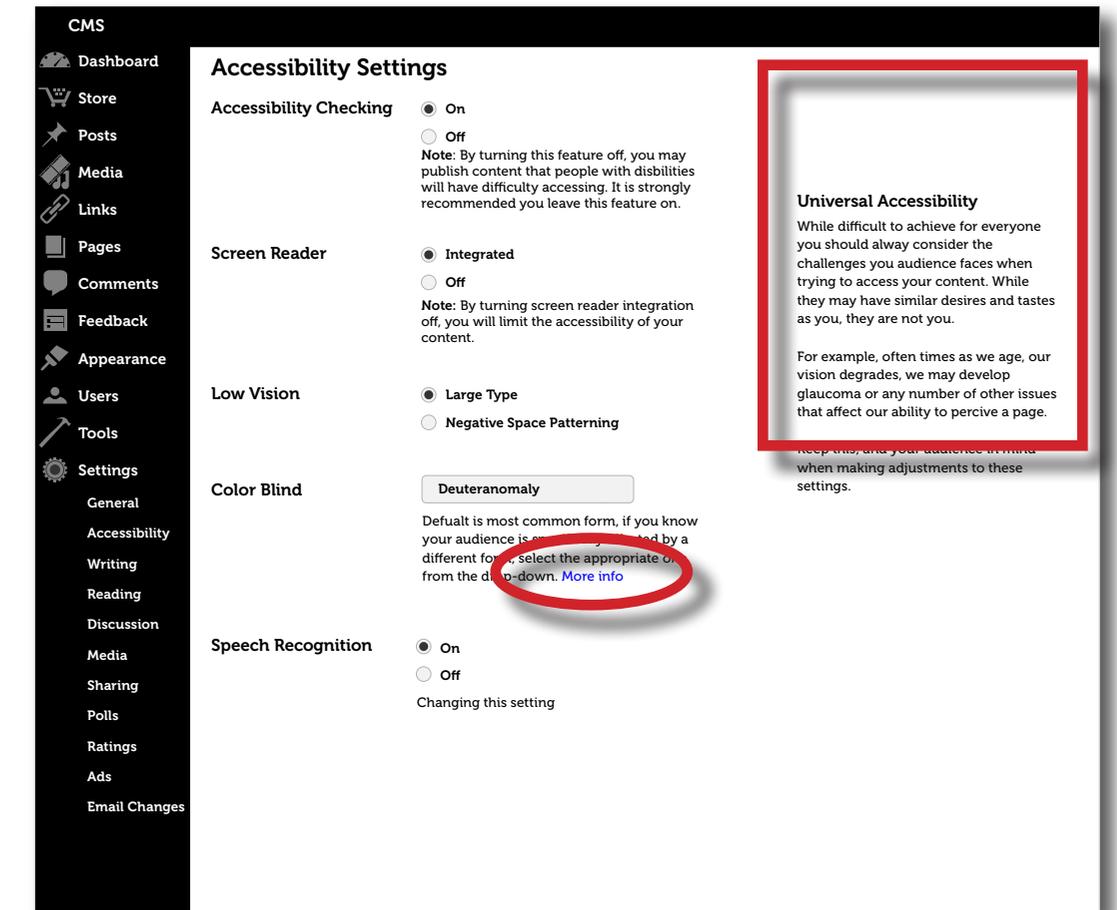
Standard CMS Interface Plus

- Standard CMS publishing interface
- One major difference: an Accessibility interface.



Accessibility Tools

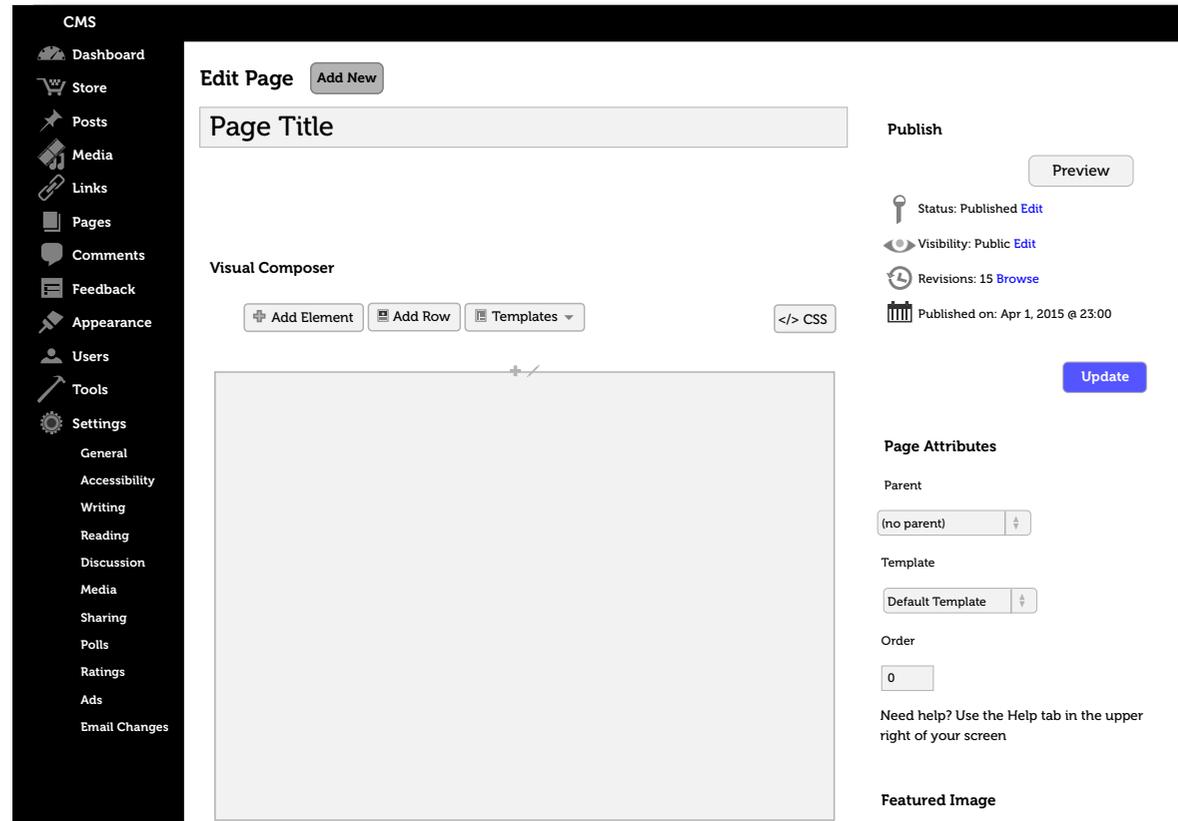
- Accessibility Interface addresses common issues
- Interface also provides educational tips as to why some settings are important.



Designer Interface

Page Building

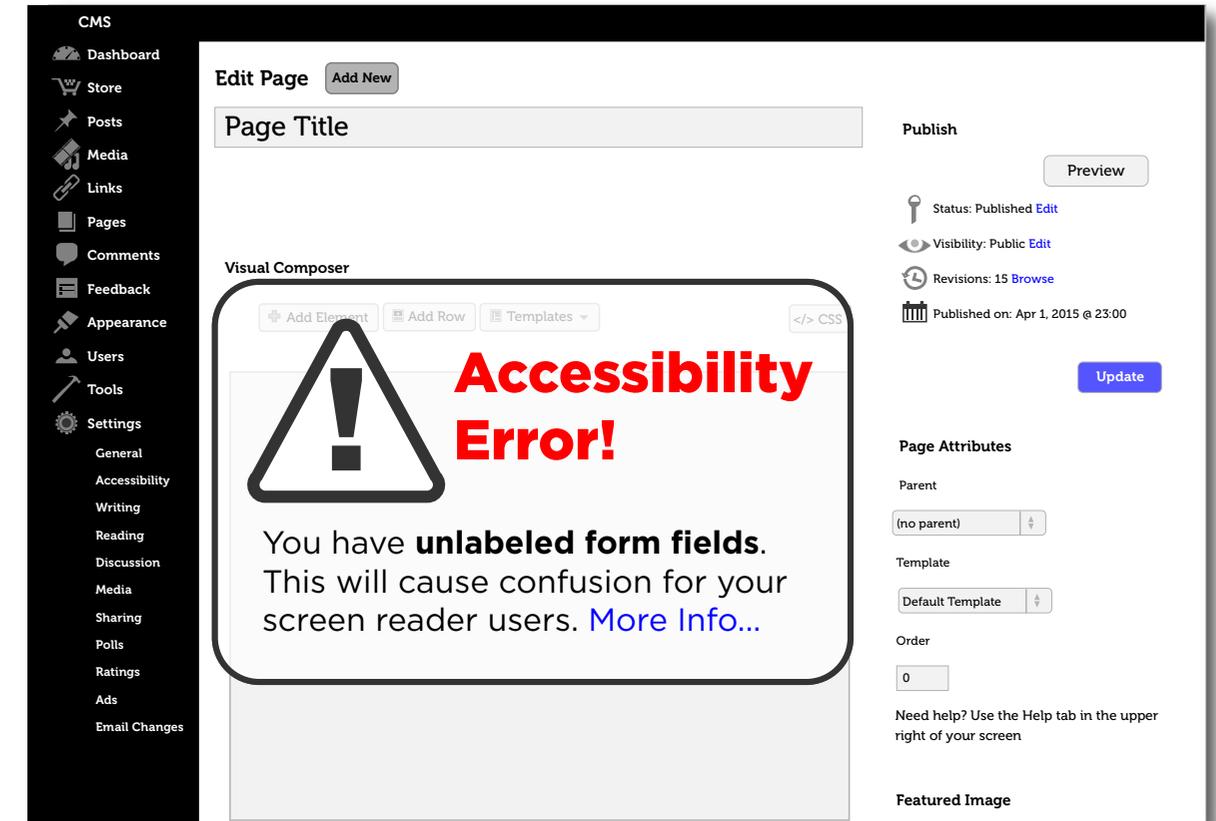
- Verification system checks all code before publishing.
- Upon finding errors alerts designer and forces fix



82

Reigning in Designers

- Preventing inaccessible pages from ever being published in the first place

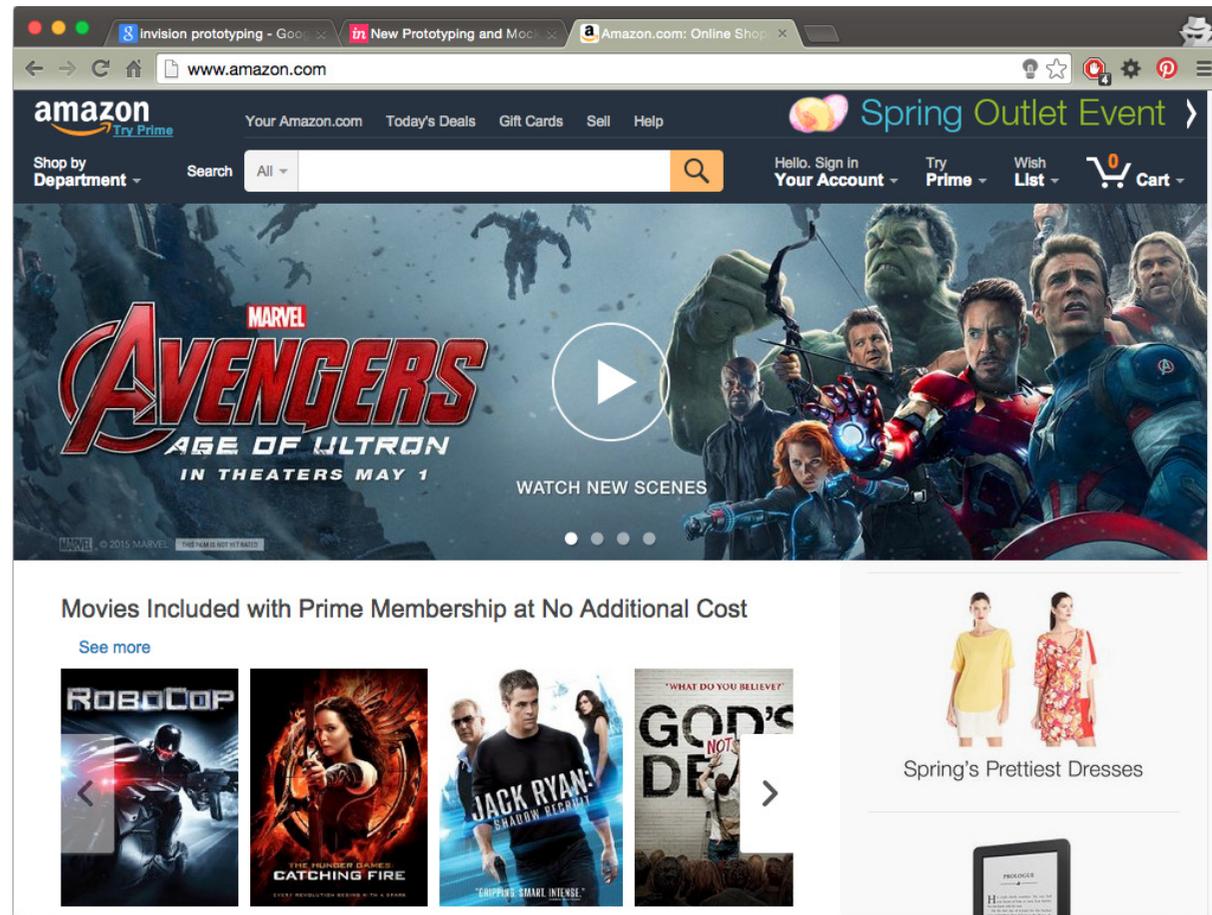


83

User Experience

Second Stage – Screenreader Detection

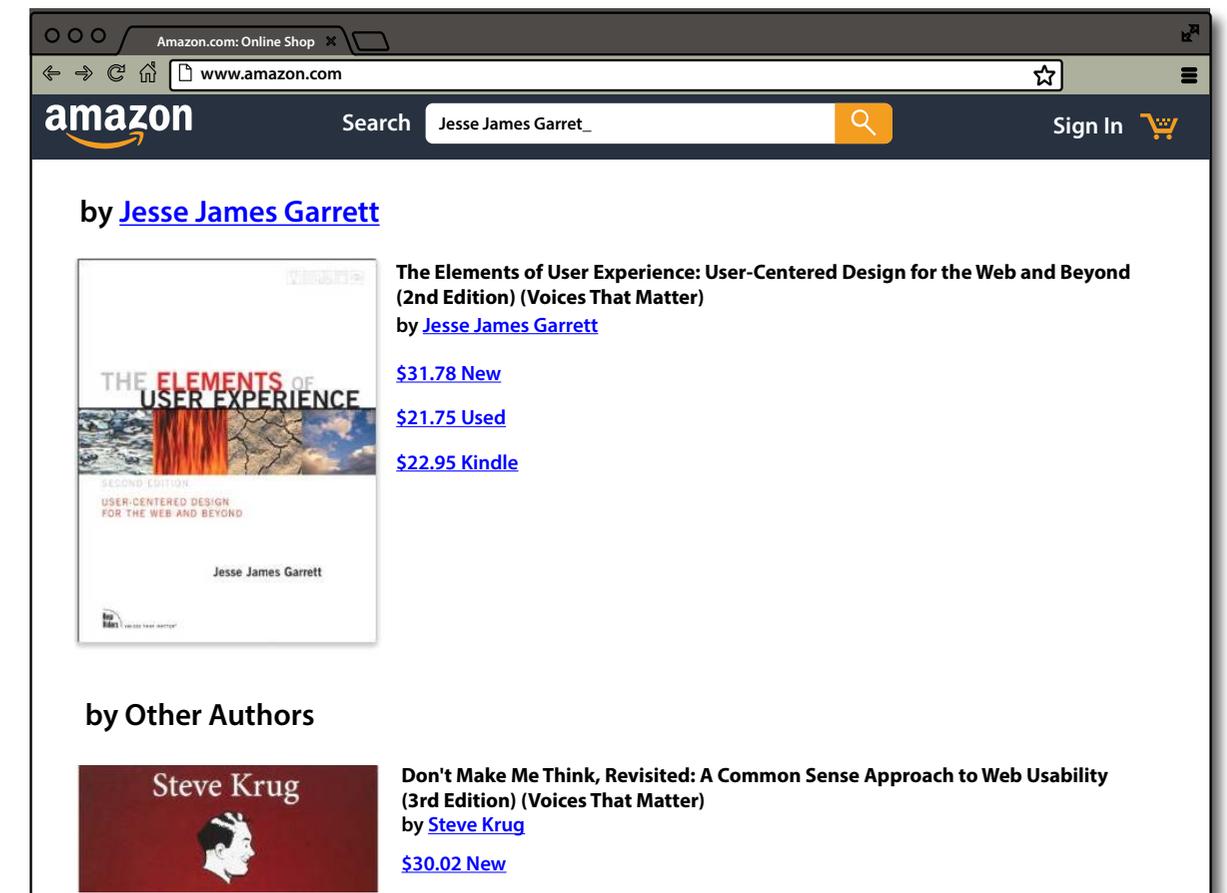
- User arrives at website and a screenreader is detected.



84

Second Stage – Interface Streamlining

- Layout simplified



85

User Experience

Third Stage – User Interaction

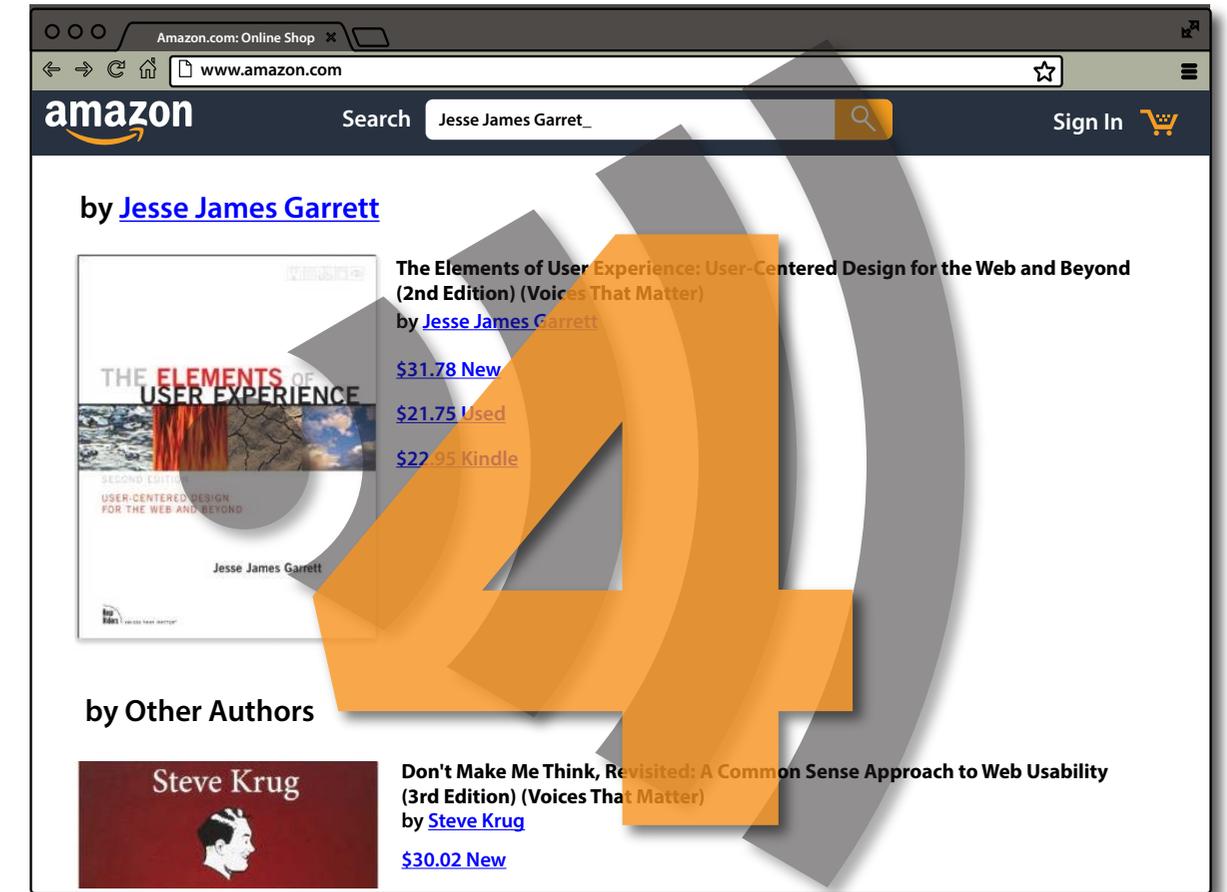
- Sections defined and read aloud to user for selection



86

Third Stage – User Interaction

- User makes selection either by keyboard input or voice command
- Web page sends information to screenreader



87



Solution



Web Accessibility Tool

Project Summary

The purpose of this project is to design a system in which all web content is reliably published as fully accessible for people who are blind or have low vision. In addition to creating an automatic checking system, it is the designer's desire to have a server-side programmatic system of identifying the kinds of content and the sections of the page so that it may be summarized

to the end-user. By doing so, it is thought there will be a massive reduction in the cognitive load placed upon the end-user, which should decrease the amount of information retention requirements at any given moment. This will result in a more, accessible, responsive, and enjoyable experience for the blind user.

Two Parts to One Puzzle

The first part of this solution is the CMS plug-in. Essentially this is a PHP based script that verifies whether or not all accessibility element attributes have been properly completed within the HTML, CSS, and JavaScript code. This verification can be run at two stages, the first when an object is selected and added to a page. The

second verification should happen before the page is published to the Web. This part of the solution targets the Web Designer.

The second part of the solution is the interactive portion which works with the end-user, assisting them in making their selections on a simplified web page.



Web Accessibility Tool

WAT Plugin Specifications

- 1.1. Plugin is
 - 1.1.1. An interface that provides pre-determined web-objects
 - 1.1.2. Script that checks for web object compliance
- Plugin integrates into common Content Management Systems (CMS)
 - 2.1. WordPress
 - 2.2. Joomla
 - 2.3. Drupal
 - 2.4. Continue developing for other CMS'
- Publishing content
 - 3.1. Designer selects from pre-made list of fully customizable web objects. E.g. tables, form image carousels, etc...
 - 3.2. Web objects all have accessibility enhancing attributes that must be filled out.
 - 3.3. When content submitted for publishing

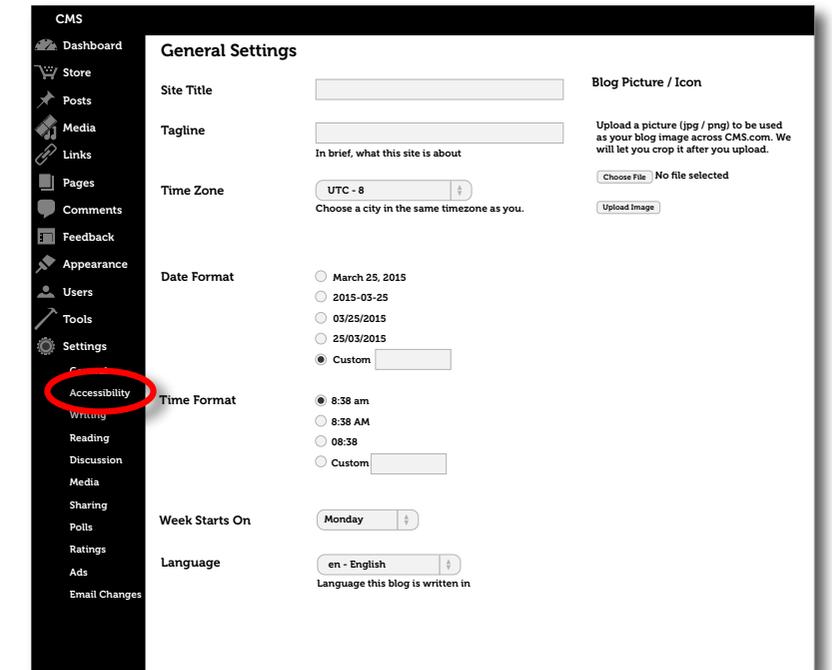
- 3.3.2. Accessibility Attributes incomplete
 - 3.3.2.1. Send back to fix

WAT Server-Side App Specifications

- 1.1. Quick link to Accessibility oriented site
 - 1.1.1. Little to know clutter
 - 1.1.2. Goal oriented
 - 1.1.3. WAT App detects screen reader or braille display
- 2.1. WAT analyzes page
 - 2.1.1. Break page into chunks
 - 2.1.1.1. Header
 - 2.1.1.2. Content
 - 2.1.1.3. Sidebars
 - 2.1.1.4. Footer
 - 2.1.2. Analyzing for
 - 2.1.2.1. Links
 - 2.1.2.2. Forms
 - 2.1.2.3. Media
 - 2.1.2.3.1. Audio
 - 2.1.2.3.2. Video
 - 2.1.2.3.3. Photos
- 2.2.2. Braille display
 - User makes selection
- 3.1. Voice
 - 3.1.1. WAT receives audio data
- 3.2. Keyboard
 - 3.2.1. WAT receives keyboard input
 - Page focus changes to user-based selection
- 4.1. If form field
 - 4.1.1. Cursor is active
- 4.2. If link
 - 4.2.1. Read aloud
 - 4.2.2. Option to selected
- New page
- 5.1. Repeat process starting at 2.1

Web Accessibility Tool

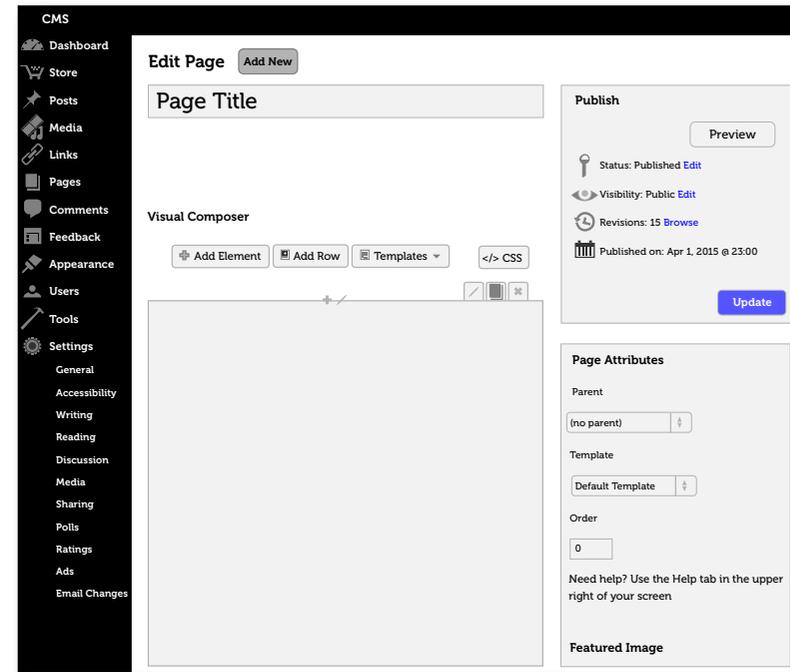
Assets - Main Interface



Generic CMS tool home page	Once accessibility plugin is installed it will appear under “Settings.”
----------------------------	---

Web Accessibility Tool

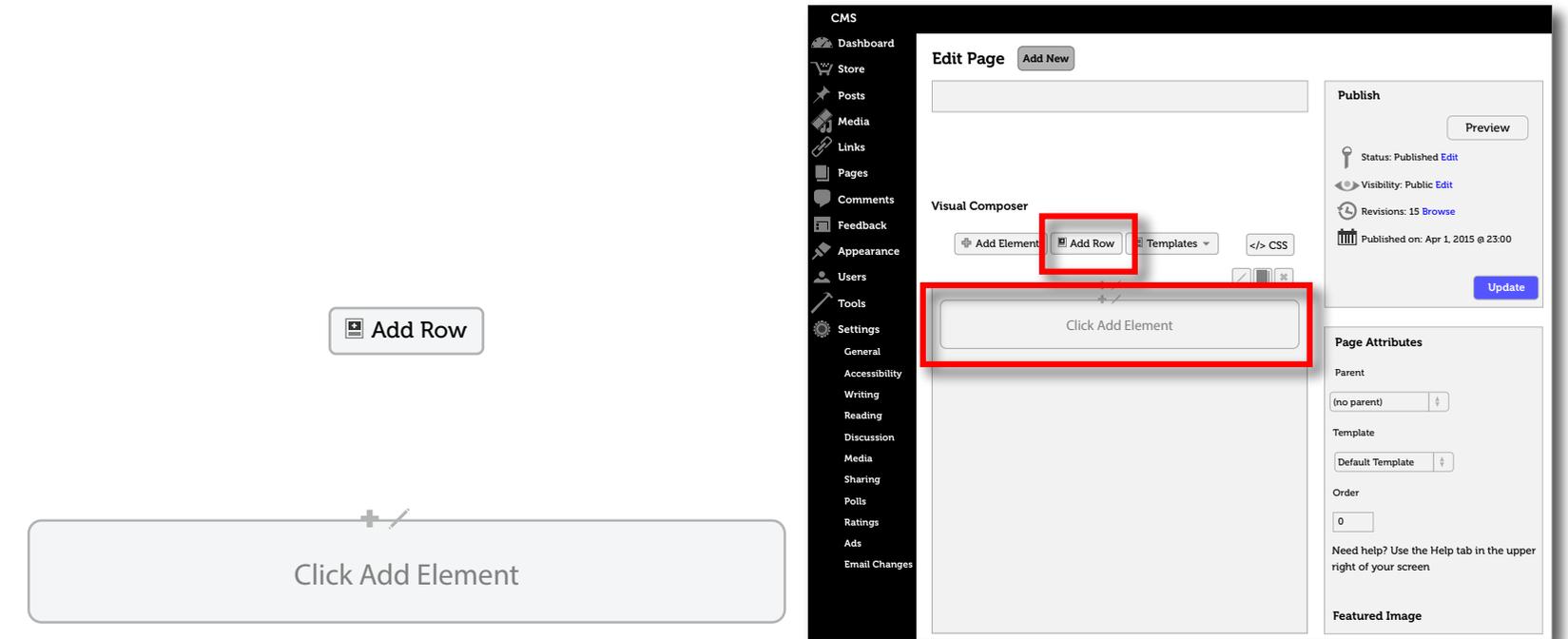
Assets – Page Builder Interface



96

Page Builder Interface	This section is where the creator is able to add content elements which all have pre-defined descriptions. This is how the accessibility tool is able to accurately describe the page to the blind user.
------------------------	--

Assets – Page Builder Interface



97

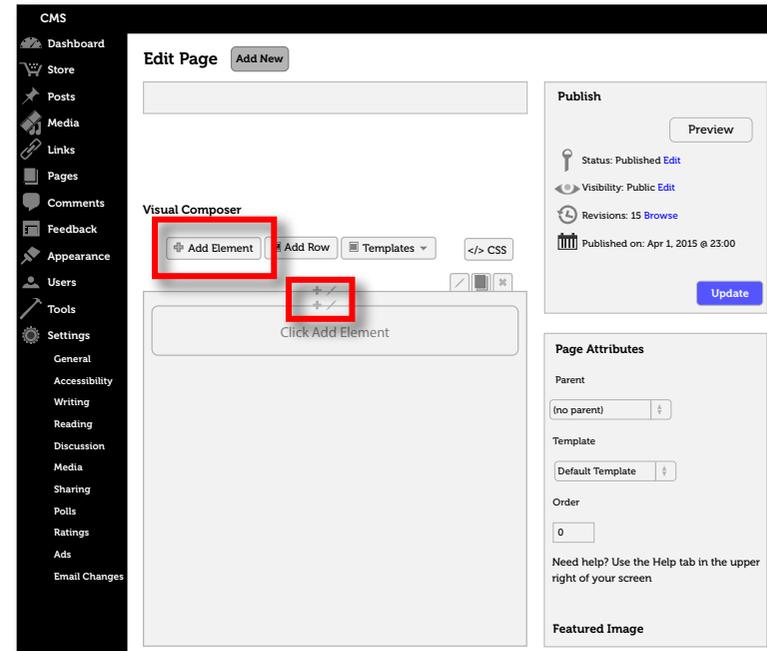
Add Button	Clicking on add button adds an editable page row. Various pieces of content, media, or other assets can go in here. This provides a high level of structure for the overall content building process.
Adding Element	adding elements can be achieved either by clicking on the button "Add Element" or by clicking on the "+" symbol at the top of each row.

Web Accessibility Tool

Assets – Page Builder Interface

+ Add Element

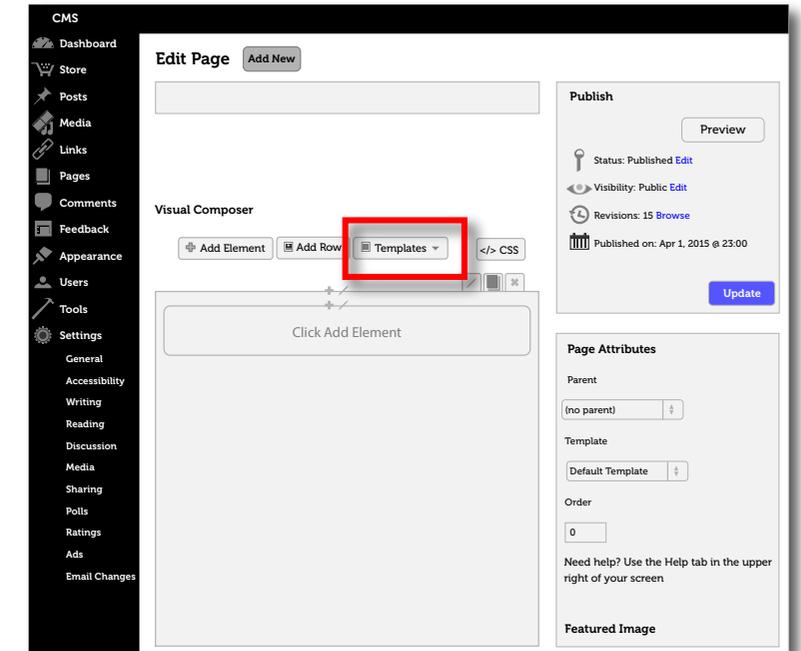
Click Add Element



Add Element Button	The most obvious way to add elements to the newly created row.
Add Element +	plus / pencil symbols are additional paths to add or edit content within the row.

Assets – Page Builder Interface

Templates



Template Button	The template button is a way to speed along production. This takes you to a list of pages that the user has previously made and saved with all of the existing assets already in place.
-----------------	---

Web Accessibility Tool

UI Graphic Assets



Dashboard Icon

Used as visual descriptive asset for CMS general settings

Shopping Cart Icon

Used as visual descriptive asset for CMS shopping tool

Push Pin Icon

Used as visual descriptive asset for CMS content posts

100

UI Graphic Assets



Media Icon

Used as visual descriptive asset for CMS media management tool

Link Icon

Used as visual descriptive asset for managing CMS linked content

Pages Icon

Used as visual descriptive asset for CMS page building tool

101

Web Accessibility Tool

UI Graphic Assets



Link Icon

Used as visual descriptive asset for managing CMS linked content

Pages Icon

Used as visual descriptive asset for CMS page building tool

Comments Icon

Used as visual descriptive asset for CMS external user comment management tool

102

UI Graphic Assets



Feedback Icon

Used as visual descriptive asset for CMS for feedback management tool

Appearance Icon

Used as visual descriptive asset for CMS appearance control tool.

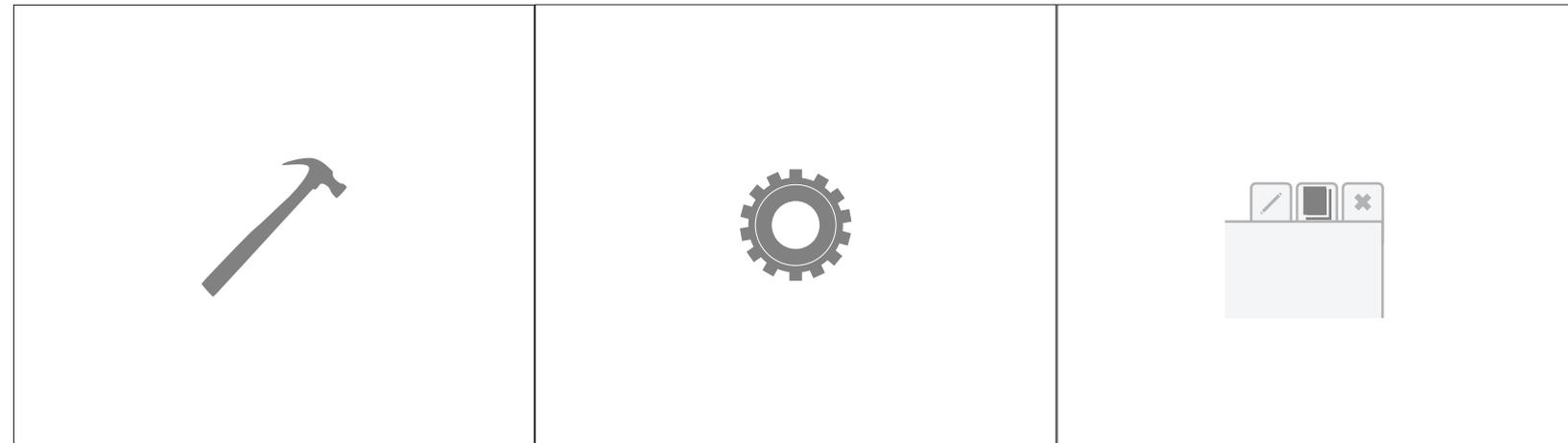
Users Icon

Used as visual descriptive asset for CMS user management tool.

103

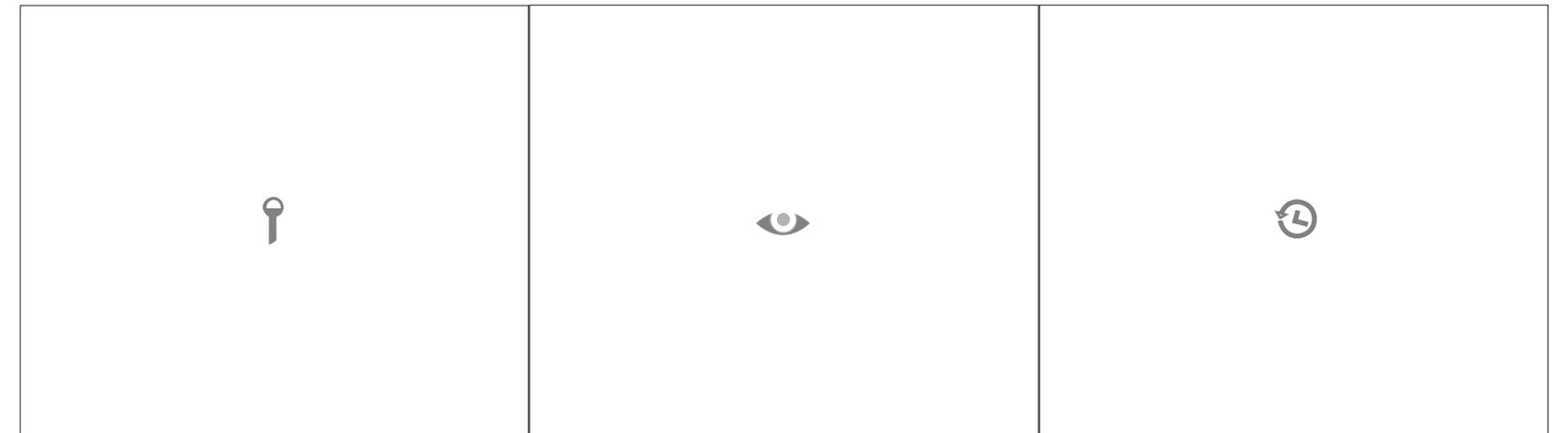
Web Accessibility Tool

UI Graphic Assets

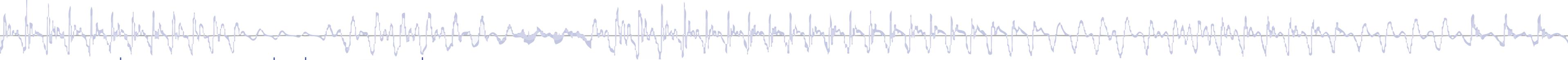


Tools Icon Used as visual descriptive asset for CMS plugin manager	Settings Icon Used as visual descriptive asset for CMS settings section. Under the settings section is where the Accessibility plugin can be found.	Edit page, add page, delete page buttons
--	---	--

UI Graphic Assets

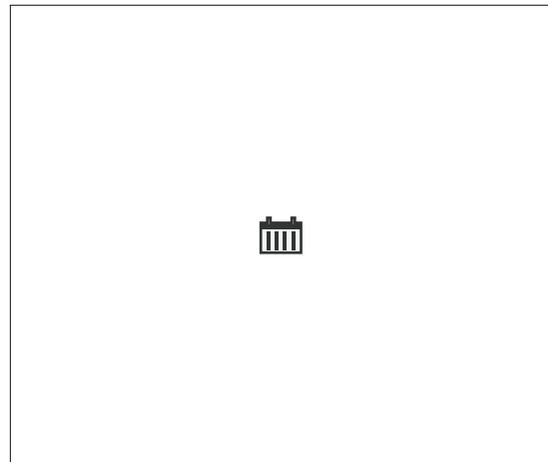


Page Status Icon Used as visual descriptive asset within CMS to uniquely identify page status.	Visibility Status Icon Used as visual descriptive asset within CMS to uniquely identify page visibility.	Revision Rollback Icon Used as visual descriptive asset within CMS to uniquely identify page revision number.
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Web Accessibility Tool

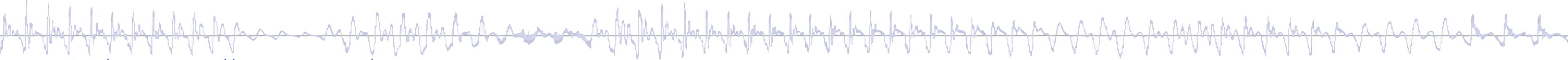
UI Graphic Assets



106

107

Publish Date Icon
Used as visual descriptive asset within CMS to uniquely identify publish date / time information.



Solution Illustrated



Timed Video Presentation

<http://andrewsteinmetz.com/other/SFSU/DAI505/walkthrough/>



Conclusion

A Summary of My Thoughts

110 Through this journey I have found that the disabled community is not generally considered as we design new products. I find this distressing as it seems that most people, designers included, think they are going to live the rest of their lives with the same abilities that they started life with. Perfect (or near perfect) vision, total mobility, balance, full cognitive abilities, are all fleeting. As we move toward the end of our lives we gradually lose many of our abilities until, eventually, we become dependant on family or society at large. This lack of sensitivity by developers, designers, and corporations needs to change. As students graduating

from a college and a design program that emphasises Social Justice it falls upon us to encourage that change.

Some make the claim that it is too costly to incorporate many of the simple fixes that would improve usability for the blind. They believe they will have to entirely re-work their websites or products or mobile apps. This is a specious argument. Even though there will be some work and expense involved in making sites universally accessible, such as incorporating a plug-in that verifies content for accessibility before publishing it or re-evaluating existing content, these costs are reduced if the fixes are included

at the beginning when a site is first built or during a product re-launch. Additionally, there are financial incentives that would further offset any development costs. These incentives come in the form of dedicated and happy customers. These customers would include both people with disabilities and the elderly who have lost abilities with time.

Feedback has been generally positive, however the solution is complicated and therefore hard for most people to grasp. This is likely due to the number of various interacting systems, and user limitations involved. This means that an actually functional prototype should be created to

solidify the solution.

The true strength of the product is in assisting the blind in obtaining equal access to content, educating both designers and developers, and elevating the importance usability issues. The real weakness in the system is getting people to use it in the first place. Convincing people that there is a problem in the first place will be difficult without wide spread support.

111



Appendix



Usability Guidelines

SF State Web Accessibility Standards

Part 1: Section 508 – 16 Checkpoints

- a. A text equivalent for every non-text element shall be provided (e.g., via alt, long description, or in element content).
- b. Equivalent alternatives for any multimedia presentation shall be synchronized with the presentation.
- c. Web pages shall be designed so that all information conveyed with color is also available without color, for example from context or markup.
- d. Documents shall be organized so they are readable without requiring an associated style sheet.
- e. Redundant text links shall be provided for each active region of a server-side image map.
- f. Client-side image maps shall be provided instead of server-side image maps except where the regions cannot be defined with an available geometric shape.
- g. Row and column headers shall be identified for data tables.
- h. Markup shall be used to associate data cells and header cells for data tables that have two or more logical levels of row or column headers.
- i. Frames shall be titled with text that facilitates frame identification and navigation.
- j. Pages shall be designed to avoid causing the screen to flicker with a frequency greater than 2 Hz and lower than 55 Hz.
- k. A text-only page, with equivalent information or functionality, shall be provided to make a web site comply with the provisions of this part, when compliance cannot be accomplished in any other way. The content of the text-only page shall be updated whenever the primary page changes.
- l. When pages utilize scripting languages to display content, or to create interface elements, the information provided by the script shall be identified with functional text that can be read by assistive technology.
- m. When a web page requires that an applet, plug-in or other application be present on the client system to interpret page content, the page must provide a link to a plug-in or applet that complies with §1194.21(a) through (l).
- n. When electronic forms are designed to be completed online, the form shall allow people using assistive technology to access the information, field elements, and functionality required for completion and submission of the form, including all directions and cues.
- o. A method shall be provided that permits users to skip repetitive navigation links.
- p. When a timed response is required, the user shall be alerted and given sufficient time to indicate more time is required.



Usability Guidelines

Additional SF State Accessibility 8 Checkpoints

1. Validate your HTML
2. Create meaningful page titles. Page titles should contain unique, short and meaningful descriptions of the content or purpose of the page.
3. Use meaningful and unique text for links.
4. Ensure there is adequate color contrast on the page
5. Inform the user about pop-ups or new windows
6. Create accessible PDF, Word and PowerPoint Files
7. Create structured content
8. Ensure logical reading order of layout tables

W3C Web Accessibility Initiative 2.0

Perceivable

Provide text alternatives for non-text content.

Provide captions and other alternatives for multimedia.

Create content that can be presented in different ways, including by assistive technologies, without losing meaning.

Make it easier for users to see and hear content.

Operable

Make all functionality available from a keyboard.

Give users enough time to read and use content.

Do not use content that causes seizures.

Help users navigate and find content.

Understandable

Make text readable and understandable.

Make content appear and operate in predictable ways.

Help users avoid and correct mistakes.

Robust

Maximize compatibility with current and future user tools.



Questionnaires

Expert Interviews

What is out there already?

What is your relationship to people with Vision Impairment?

What do I need to know to be educated? I need to discover what I don't know?

What are accessibility issues for the blind?

What input devices are most commonly used?

What output devices are most commonly used?

What do the blind most commonly use the web for?

What do the blind like about accessing the web?

What do the blind NOT like about accessing the web?

Which hardware platforms are most popular? (Mac/PC/Linux)

What web browsers are used most?

Do the blind silence system wide alerts? Basically, how do they deal with the multi-tasking nature of modern operating systems?

Expert Interviews

What are the most common peripherals the blind use to enhance their Web browsing experience?

How can accessibility be improved for the blind?

I realize that people do not like to be defined by their disability, but I thought there would be online support groups for people with Vision Impairments. I could not find any online social media communities. Are most social activities for the blind held offline and in person?

Are smartphones and tables used to browse the Web?
If not, why?

If so, which platforms are most used (iPhone, Android, Windows, Blackberry, etc...)

What Web usability issues are not currently being addressed?

What are some concerns for Web usability I haven't thought of?

Are there any other experts you might be able to refer me to?

What's the likelihood of me being able to work with a group of volunteers where I can watch how they used the Web and ask them questions?



User Survey

In-Person Survey

How old are you?

Are you Blind or Low Vision?

Do you browse the World Wide Web?

Yes

No

How often do you browse the Web

Daily

Weekly

Monthly

Less than monthly?

What do you most often use the Web for?

Shopping

Entertainment

News & Information

Other [fill in]

Think back to the last time you had a frustrating experience, what were you trying to do?

On a scale of 1 (not very important) to 9 (very important), how important was this task to you?

1 2 3 4 5 6 7 8 9

How did you ultimately solve this problem?

(Please choose only one answer)

I knew how to solve it because it has happened before

I ignored the problem or found an alternative solution

I figured out a way to fix it myself without help

I was unable to solve it

I asked someone for help (If chosen, please include number of people asked on separate line after your answer).

In-Person Survey

I tried again

I consulted online help or the system/application tutorial

I restarted the program

I consulted a manual or book

I rebooted

How often does this problem happen?

(please answer only once)

First time it happened

One time a day

More than once a day

Once a week

Several times a week

Once a month

Several times a month

Several times a year

On a scale of 1 (not very frustrating) to 9 (very frustrating), how frustrating was this problem for you?

1 2 3 4 5 6 7 8 9

Of the following, how did you feel?

Angry at the computer

Angry at yourself

Helpless or resigned

Determined to fix it

Neutral

Other

Observational Tools

Web Usability Study
Spring '15

Date: _____ Duration: _____
Time: _____ No. of
Researcher: _____ Location: _____ Participants: _____

<p>1</p> <input type="checkbox"/> Age: _____ <input type="checkbox"/> Blind <input type="checkbox"/> Low Vision	<p>2</p> <input type="checkbox"/> Age: _____ <input type="checkbox"/> Blind <input type="checkbox"/> Low Vision	<p>3</p> <input type="checkbox"/> Age: _____ <input type="checkbox"/> Blind <input type="checkbox"/> Low Vision
<p>4</p> <input type="checkbox"/> Age: _____ <input type="checkbox"/> Blind <input type="checkbox"/> Low Vision	<p>5</p> <input type="checkbox"/> Age: _____ <input type="checkbox"/> Blind <input type="checkbox"/> Low Vision	<p>6</p> <input type="checkbox"/> Age: _____ <input type="checkbox"/> Blind <input type="checkbox"/> Low Vision
<p>7</p> <input type="checkbox"/> Age: _____ <input type="checkbox"/> Blind <input type="checkbox"/> Low Vision	<p>8</p> <input type="checkbox"/> Age: _____ <input type="checkbox"/> Blind <input type="checkbox"/> Low Vision	<p>9</p> <input type="checkbox"/> Age: _____ <input type="checkbox"/> Blind <input type="checkbox"/> Low Vision

Equipment
OS: Mac / Windows / Linux
Input: Keyboard / Mic / Touchscreen
Output: Speakers / Braille Display
Screen Reader: JAWS / NVDA / Other: _____
Browser: Chrome / Firefox / IE / Safari / Other

Notes:

Consent Form

San Francisco State University
Informed Consent to Participate in Research
Web Usability for blind and low vision students

A. PURPOSE AND BACKGROUND
 The purpose of this research is to learn about issues that surround blind and low vision web users and attempt to understand the challenges they face.

The researcher, Andrew Steinmetz, is an undergraduate student at San Francisco State University conducting research for an undergraduate degree in Visual Communications and Design through the Department of Design and Industry. You are being asked to participate in this study because you have self-identified as a blind or low vision student who is familiar with the web accessibility environments supported by San Francisco State University and the Disability Programs and Resource Center (DPRC).

B. PROCEDURES
 If you agree to participate in this research, the following will occur:

- You will be observed as you browse the Web
- You will be asked Web usage and navigation questions
- the interview will be audio recorded to ensure accuracy in reporting your statements.
- Photographs of your seated position in relationship to the computer will be taken to establish user ergonomics
- the interview will take place in the DPRC's office at a time arranged by DPRC staff.
- the researcher may contact you later to clarify observational ambiguities in web usage within one month of the interview.
- total time commitment will be no more than 1 hour.

C. RISKS
 There is a risk of loss of privacy. However, no names or identities will be used in any published reports of the research. Only the researcher will have access to the research data.

D. CONFIDENTIALITY
 All research data, audio recordings, and photographs will be kept in a secure location and only the researcher will have access to this information. All research data will be stored in an encrypted document on a password protected computer. Audio recordings will be destroyed at the end of the study. Photographs included in the study will be kept, however all remaining photographs will be destroyed at the end of the study.

E. DIRECT BENEFITS
 There will be no direct benefits to the participant.

F. COSTS
 There will be no cost to you for participating in this research, as the study will be conducted on campus.

G. COMPENSATION
 There will be no compensation for participating in this research. However, if you are a DPRC employee who is observed while working for DPRC, you will be paid by DPRC for working.

02/19/15 Page 1 of 2

Web Usability for the Blind
Andrew Steinmetz

H. ALTERNATIVES
 The alternative is not to participate in the research.

I. QUESTIONS
 If you have any further questions about the study, you may contact the researcher by email at andrew@andrewsteinmetz.com or you may contact the researcher's advisor, Professor Linder at mlinder@sfsu.edu.

J. CONSENT
 You have been given a copy of this consent form to keep.
PARTICIPATION IN THIS RESEARCH IS VOLUNTARY. You are free to decline to participate in this research, or to withdraw your participation at any point, without penalty. Your decision whether or not to participate in this research will have no influence on your present or future status at San Francisco State University.

Signature _____ Date: _____
Research Participant

Signature _____ Date: _____
Researcher

Page 2 of 2



Expert Interview

David Vasquez

Consultant

Center for Independent Living, Inc.

David Vasquez à (510) 287-4707

Company: Center for Independent Living, Inc.

Title: Consultant

Current Project: working for CIL as accessibility consultant for BART. Focusing one-way finding using smartphone within BART system.

Thank you so much

Are you familiar with the DAI Senior Project class?

Primarily a design research course.

What is your relationship to people with Vision Impairment?

Works with people with VI on day-to-day basis. Office environment, science environments, human interfaces. Understanding how they would be working with science trials, and educating scientists to work with them.

Product design & Special Ed.

What input devices are most commonly used?

Standard corded keyboard

Braille input on keyboard

Braille on braille note

What output devices are most commonly used?

Braille display

Speakers with screen reader

Standard screen with screen magnifier.

What do they use the web for?

No limit really, e.g. worked on project annotating YouTube videos

What do they NOT like about accessing the web?

Outside his scope of experience

NIH put out request for proposal (RFP) funded work to fill need of user base. (e.g. YouTube annotation)

Which hardware platforms are most popular? (Mac/PC/Linux)

Dunno

Are smartphones and tables used to browse the Web?

Yes, iPhone

If so, which platforms are most used (iPhone, Android, Windows, Blackberry, etc...)

Yes, iPhone

David Vasquez

Consultant

Center for Independent Living, Inc.

What Web usability issues that are not currently being addressed?

Dunno

Are there any other experts you might be able to refer me to?

Lighthouse – Technology Trainers – Leah Gardner

Lighthouse – try contact reception to meet with a Technology Trainer

Smith-Kettlewell Eye Research Institute – Expert in digital media access – Josh Miele – 415.345.2113

<http://www-test.ski.org/Rehab/JAMiele/>

<http://www.mielelab.org/>

What’s the likelihood of me being able to work with a group of volunteers where I can watch how they used the Web and ask them questions?

Lighthouse – try contact reception to meet with a Technology Trainer

Take technology classes on Visual Impairment in SFSU CEL



Expert Interview

Leah Gardner

Technical Trainer
San Francisco Lighthouse

Name: Leah Gardner

Company: East Bay Center for the Blind

Title: Consultant

Contact: Wed – Fri 10am – 3:30pm
(510) 843-6935

lgardner1375@gmail.com

Thank you so much

Are you familiar with the DAI Senior Project class?

Primarily a design research course.

What is your relationship to people with Vision Impairment?

Tech trainer

Blind herself

What are you training the blind to do?

Internet related training with mostly seniors

Seniors - Shopping online, online banking, buying audible books

Younger peeps – research skills

iPhone training

What are accessibility issues for the blind?

Problems with Retail, e.g. Godiva chocolate

Adding items to cart à submit button is a picture

Problem seems to be increasing

Top 2 for Windows = Firefox and IE, Chrome sucks for the blind. Ironically Gmail is highly accessible

Flash (media) players are often bad b/c buttons aren't properly tagged

Images no alt tags

Want to get info ASAP, less "clutter." E.g. is highly accessible but very cluttered.

Web designs often missing one crucial piece

What input devices are most commonly used?

Primarily keyboard

Sometimes external braille display

Touch-screen text as with iPhone

What output devices are most commonly used?

Speakers

Braille

Which hardware platforms are most popular? (Mac/PC/Linux)

Windows à Mostly PC because of job place-ability and Macs less common in office

iPhone

Leah Gardner

Technical Trainer
San Francisco Lighthouse

Do the blind silence system wide alerts? Basically, how do they deal with the multi-tasking nature of modern operating systems?

Screen readers usually handle it.

Windows 8.1 has a conflict with their voiceover tech and doesn't turn off.

What are the most common peripherals the blind use to enhance their Web browsing experience?

Braille display \$3000-\$6000 à small pins very delicate.

Braille printer \$4000-\$6000

JAWS \$1000

Flatbed scanner for OCR (download)

External keyboard esp for iPhones and android

How can accessibility be improved for the blind?

Web Designers need to focus on design models. Can all important tasks be performed with a keyboard? Yes or No?

Label everything

Less cluttered

Apple's iPhone is a shining star of accessibility because it was integrated in the OS at the beginning. Coming up with a fix later doesn't work as well.

What Web usability issues are not currently being addressed?

Still a long way to go with everything. Web accessibility needs to be integrated from the ground up.

Filling out forms or setting up profiles on job websites.

I recently read a 2006 article from the International Journal of Human-Computer Interaction written by Dr. Jonathan Lazar of Towson University. In this article he lists what he found to be the top causes of user frustration. In order they are:

- page layout causing confusing screen reader feedback;
- conflict between screen reader and application;
- poorly designed/unlabelled forms;
- no alt text for pictures; and
- 3-way tie between misleading links, inaccessible PDF, and a screen reader crash.

Screen reader vs app conflict is #1 of the 3-way tie, inaccessible PDF most common

Restaurant menus are like this online too

What are some concerns for Web usability I haven't thought of?

None



Expert Interview Transcript

Catherine Kudlick

Director of Longmore Institute

I do have a few questions that I thought of this morning specifically for you. In a nutshell, I wasn't entirely clear what the mission of the Longmore Institute was.

This is useful for us, we're actually meeting with our advisory board tomorrow to like talk about our future and our mission. But the bottom line of it is that we wanna change thinking around disability to view people with disabilities as kind of creative and generative forces that have benefits for everybody. And if you can change attitudes of people about disabled people then all the other stuff can follow. Say you get a web designer who comes into a class where people are talking about accessibility issues and disability, well if they were never exposed to this being a hip cool thing and just saw it in terms of compliance? Then, you know, who wants to sit there and be a compliance drone? You know, it's like no way! You want to be the one that's like in there innovating. Wow! Disability and disabled people are a way for me to rethink the assumptions that I take for granted and rethink who I program rethink how I do stuff and it will give me that creative new tension place to rethink everything. It's going to be really cool. So our mission is to people to go to that place inside. Either culturally, intellectually, or emotionally or whatever where they can say disability can be really interesting and I should pay attention to this, it's really cool

So you know, easier said than done. Hah! But we do it through a series of programs. We co-host with San Francisco Lighthouse, the Superfest International Film festival, which everyone is immediately, yeah, everyone is *gasps* disability film, blind people film what do we do? You start finding that if you require your film makers to build in audio descriptions, at least from films they've already made, you get all sorts of interesting things. We showed a porno movie last year called "Crutch," and it was at the film festival. Very interesting and smart film, and the director was required to put audio description on it, so we showed the audio description to everybody who comes to the films. We don't just put the poor three blind people in the corner and let them listen to a hushed voice or whatever. It's like, everybody hears it and they experience film in a completely different way because of that. So it's kind of like, you think about the early days of MTV where movies were put to music, it's that kind of move in a way. And everybody started thinking wow, this is a whole other way to hear music. So this is a whole other way to see movies. You have these audio description things going. So this director got somebody to audio describe it and they did a really smart job and the director says now that he will not show it any other way. And it kind of brought out other elements. It might not work for every film in every circumstance, but that kind

Catherine Kudlick

Director of Longmore Institute

of thing matters. Or the dream down the road would be that some movie producer or director would get so excited by the idea that there might be audio description later that they would craft a film based on that fact. So re-craft the whole project so maybe instead of requiring audio description, you have the characters speak it out as part of their dialogue or you have sound effects that convey what's on the screen or whatever. The cinematic experience we've been thinking purely in visible terms, but it's actually a whole constellation of terms that people who can see allow us to re-think. So it's really really exciting.

We're doing that and we're doing a history of this really amazing occupation of the Federal building in San Francisco in April 1977 where more than 100 disabled people occupied the Federal building for over a month. The longest occupation of a Federal building in U.S. history. It's kind of the pre-cursor to the ADA. What they were sitting in for was to get the government to sign legislation to say you can't discriminate against disabled people. So we're having this exhibit, and we're having it be interactive and also have ways for people to interact with it non-visually, given that's your interest. We'll have a braille rail around all of the interpretive text so people will always know where to look for reading. There's going to be clips, oral history clips that are captioned so that will be part of the oral experience

too. So there's all sorts of ways that's informing our decisions about what we put there, how big we made the text. We don't want to turn it into like a trade show exhibition project or anything, but we want it to be artsy, creative and interesting but also will access built in from the very beginning. All of our discussions from day one were about access.

That's super interesting and actually leads me to my next question, I believe—I've been told—that two of our professors work with Longmore Institute, Pino Trogu and...

...Silvan Linn, ya they worked on the exhibit so you can talk to them. Silvan did the computer interactivity. We have a bullhorn that people can shout into "I'm patient no more!" You say what you're impatient about. They exhibit is call Patient No More because it's a play on word because they don't want to be medicalized as only poor helpless things that only need to be treated, but it's also "I'm impatient because I want this legislation to be signed." We have a bullhorn where we encourage people to come and shout their cause into it. And we also have a whiteboard people can write on so there are different modalities.

Silvan did the programming for both of those, he's building the interactive elements so that the voice doesn't broadcast out over the entire place where the



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Catherine Kudlick

Director of Longmore Institute

exhibit is because that would drive everybody bonkers. But it goes up on the web and people can here the audio clips that will be transcribed or they can see the visual ones. There will be a picture that's taken and their words will be scrolling across the screen.

And this is all part of the upcoming exhibit?

Yes, in July. It will be over in Berkeley at the Roberts Campus which is kind of a center of disability. It will be up there from July till the end of December.

I've made an appointment to speak with Pino about it, because I'm in a hybrid specialty class in the design department where I'm working on projects for the campus. The project I'm currently working on is the new Design Gallery that's going in Fall in our building. So I'm trying to keep accessibility in the forefront of all our minds...

Yeah!

So that's why I want to talk to Pino as well...

He worked pretty hard with his students. He kind of coming at this and learning too, he's not an expert in those kinds of things. He's great though, you should talk to him about what we worked on in the exhibit in terms of designing the space accessibly, what kinds of things you have to take into account all that. The other

person you want to talk to is Ricardo Gomes. He has done a lot of work on seating for the elderly and other design sort of stuff, so there's a number of people over there.

There is a blind architect, if you're interested in that side of things, his name is Chris Downey.

Oh ya! I love that guy! Is he here in the Bay Area?

He is, he's on the board of the San Francisco Lighthouse. Lighthouse a new building they are designing so you might talk to... I hate to bounce you back over to the Lighthouse but you can talk to them for different reasons. Because of the new building they're design.

I just re-watched his TED Talk. I love his quote so much I'm including it in my project, "There are those with disabilities and there are those who haven't quite found theirs yet." That really hit me because before I transferred here I took a social gerontology class at CCSF. And I gotta say before I took that class I was your standard typical white callous male but then I was like, oh wow! These are all the things that are going to happen to me before I die.

It's weird, how did they get to you? Because I know a lot of people click off on that stuff even once it's being told to them. It seems like it stuck?

Catherine Kudlick

Director of Longmore Institute

Well, I am an older student and 'cuz you know. I was, I think, 42 when I was in that class.. 43? At that point I'm noticing I'm not as spry as I was ten years ago, recovery takes a lot longer. I think that's kind of what it was. Middle age is the great equalizer.

No, for sure for sure. In fact one of our next projects at the institute is going to be savvy aging. It's the idea that the disability community has figured out all this amazing stuff. Be it information about healthcare, or how to use an iPad, or you know all this amazing stuff that could be so useful. Plus the attitude that goes with it. So many older people go in with the attitude like I should ask for that, or if I ask for that it's going to stigmatize me. You want to teach a whole aging population to go in and say, you what? I want audio description when I go to the show. I want hearing assistive devices. I want cool assistive tech that's not just like a giant two year olds toy that's ugly and clunky and not very good.

If you want to read a book that will blow you mind, read Graham Pullin's book, called Design Meets Disability. That kind of embodies our philosophy at the institute. He says what happens if you put designers who never thought about disability in a room where they're asked to design cool devices. Then all bets are off.

Seriously, it's a little off topic, but dealing with issues of the elderly... After taking that class I became super-sensitive to my mother-in-laws issues. And she's in her mid 70s I believe and uh... She was living in Boston which is a fantastic city to live in as a senior...

Transportation...

...And senior services...

Culture...

...The things she got for free done to her house, fixing it and bringing it back up to market is pretty impressive. But dealing with the family, the kids... They don't want to hear the issues, even she resisted it, it's kind of funny. And once she moved up here on a guilt trip she realized she was better off there it finally sunk in everything I was telling her was for her benefit. And then she came to visit us, but I work from home and I said, "Well you know, you're welcome to hangout but you're going to get board, so I would suggest that you go to the 30th street senior center." Because it's supposed to be a fantastic place. But she hated the idea. Essentially it's a four story building and each floor does a different thing. And by the time you get to the top you get to play. [continues] As I put it to my friends, we need to deal



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Director of Longmore Institute

with Seniors and their issues now, because we don't want a bunch of Boomers dying on the street.

Haha! That would be bad... But it's more than that, how a society treats its seniors is really a reflection on the moral values of that society. When you think, up until fairly recently historically seniors were the ones with the wisdom. And you know seniors are a pain in the ass, I'm dealing with my aging parent. But it's great too. The founder of the Gray Panthers, a woman named Maggy Kuhn, and she wrote this great autobiography, I think it should be mandatory reading for everybody. She's so smart and feisty.

It's not just disability, it's aging senescence, it happens to us all

It's part of the same thread, that's one of the things we're discovering.

And that's all of my questions.

So what's the plan? And what do you want your outcome to be for this? I know you're not supposed to know the solution, but what's the final thing that you're supposed to have?

So we design a solution, it can be an installation, it be a product, it can be literally just education materials. And they will eventually get displayed in

Jack Adams hall. I think we have to have a head for that going in there as well. I would love it if I could figure something out that will address just one little issue. But, programmatically speaking, a lot of these things have been address, it's just that people aren't including that solution in their designs.

So how do you re-imaging design specs so that's automatically built in?

I would say that all design books, first of all put that last chapter [that addresses usability] in the front. That's the first thing. To explain the scope of what you're doing and how it affects everyone. And also give just good solid arguments, it's fiscally smart, it's inclusive, you know just go down the line. It doesn't limit your design like you think it does.

God, I'm think of so much stuff, there was an interesting video called "Talk Talk" out of the UK in two parts. It's this business guy who's kind of arrogant and kind of jerky. And he's all excited because he's going to go on a date, but something happens he has a drink and falls asleep but he wakes up in a world where everything is geared toward disabled people. All the books are in braille, and all the people on the streets are signing and they're frustrated because he won't use sign language back. It's just one thing after another. And the movie starts off with one of those pro forma business

Catherine Kudlick

Director of Longmore Institute

meeting where he says "Yes, we'll help the disabled people. Yes, we'll do a white paper on it..." My thought went there because maybe one of your interventions could be coming up with a training video or something that could be shown in a class that could justify putting the last chapter [on usability] first...

It's funny that you say that, because to explain it to my class—we have to do a presentation every week—and none of them understood how disconcerting it is to deal with a web page without using your mouse. So I did a screen capture of me trying to go through a couple different things, using Chrome which I didn't know at the time is the worst of all browsers. It's the opposite for sighted users, it's one of the better browsers

Yeah, it's really bad

So I showed it to them, and even Professor Linder was freaking out. And they we like this is what it's like? And I said, yes but it's worse. Now imagine not seeing what's happening and seeing the error.

The other piece that people don't always acknowledge, you go to any computer guru or whatever, especially in the Mac world and they'll say you know something, key commands are where it's at. So you want it built in, why rely on the mouse for everything?

How do you visualize changing peoples minds about something? What's makes them click and get it? What I do sometimes to kind of blow peoples minds a little bit, it's the same message in a way. We have a whole collection of pirates and I'll put them out and show people and say what is this? And they'll say Capt. Hook, or pegleg, whatever. And I'll say is that all? Have you ever thought of these as disability action figures? There's so much in that question and the revelation that happens there. If we can find the place to convey that revelation in everything we do... You want the design equivalent of that. Not just that my sighted experience isn't accessible to blind people, but oh! I've been thinking in all of these ways and suddenly there's something more interesting to think the things I thought.

I'm excited by your project and if you want to be in on some of the conversations around the exhibit. We have a guy that volunteering, he's a sound and video specialist rigging up all of the devices we'll use for the oral histories. And he's a young dynamic guy who has been bitten by the accessibility bug. And if you want to look at any of that or talk to him about what he's doing.

Well definitely I'd like to keep in touch. I'm going to speak with Pino and I'm going to try and corner Silvan.

Feature Comparison

Reading Text

Description	JAWS Command	NVDA Command
Say Prior Character	←	← or Numpad 1
Say Next Character	→	→ or Numpad 3
Say Character	Num Pad 5	Numpad 2
Say Character Phonetically	Num Pad 5 twice quickly	
Say Prior Word	Insert + ←	Ctrl + ← or Numpad 4
Say Next Word	Insert + →	Ctrl + → or Numpad 6
Say Word	Insert + Num Pad 5	Numpad 5
Spell Word	Insert + Num Pad 5 twice quickly	Numpad 5 twice quickly
Say Prior Line	↑	↑ or Numpad 7
Say Next Line	↓	↓ or Numpad 9
Say Current Line	Insert + ↑	NVDA + ↑ or Numpad 8
Spell Current Line	Insert + ↑ twice quickly	NVDA + ↑ twice quickly
Say Prior Sentence	Alt + ↑	
Say Next Sentence	Alt + ↓	
Say Current Sentence	Alt+Num Pad 5	

Reading Text

Description	JAWS Command	NVDA Command
Say to Cursor	Insert + Home	
Say from Cursor	Insert + Page Up	
Spell to Cursor	Insert + Home twice quickly	
Spell from Cursor	Insert + Page Up twice quickly	
Say All	Insert + ↓	
Fast Forward during a Say All	→	
Rewind during a Say All	←	
Say Color	Insert + 5	
Say ASCII or Hexadecimal Value	Num Pad 5 three times quickly	
Say Font	Insert + F, twice quickly	
Start Skim Reading	Ctrl + Insert + ↓	
Skim Reading dialog box	Ctrl + Insert + Shift + ↓	
Display Skim Reading Summary	Insert + Windows Key + ↓	
Read all starting at current position		NVDA + ↓ or Numpad +

Reading Text

Description	JAWS Command	NVDA Command
Top line		Shift + Numpad 7
Bottom Line		Shift + Numpad 9
Start of Line		Shift + Numpad 1
End of Line		Shift + Numpad 3

Voice Rate

Description	JAWS Command	NVDA Command
Decrease Voice Rate	Ctrl + Alt + Page Down	Ctrl + NVDA + ↓
Increase Voice Rate	Ctrl + Alt + Page Up	Ctrl + NVDA + ↑
Decrease Voice Rate (when using SayAll)	Page Down	
Increase Voice Rate (when using SayAll)	Page Up	
Change Voice Settings (Inflection, Pitch, etc.)		Ctrl + NVDA + ←/→

Headings & Lists

Description	JAWS Commands	NVDA Commands
Headings Quick Key	H	H
Headings level 1-6	1 - 6	1 - 6
List of Headings	Insert + F6	
List Quick Key	L	L
List Item Quick Key	I	I

Tables*

Description	JAWS Command	NVDA Command
Table Quick Key	T	T
Cell to Right	Ctrl + Alt + →	Ctrl + Alt + →
Cell to Left	Ctrl + Alt + ←	Ctrl + Alt + ←
Cell Below	Ctrl + Alt + ↓	Ctrl + Alt + ↓
Cell Above	Ctrl + Alt + ↑	Ctrl + Alt + ↑
First Cell	Ctrl + Alt + Home	
Last Cell	Ctrl + Alt+END	
First Cell in Column	Ctrl + Alt + Shift + ↑	
Last Cell in Column	Ctrl + Alt + Shift + ↓	
First Cell in Row	Ctrl + Alt + Shift + ←	
Last Cell in Row	Ctrl + Alt + Shift + →	

*NVDA Combines moving and reading

Feature Comparison

Tables*

Description	JAWS Command	NVDA Command
Say Current Cell	Ctrl + Alt+Num Pad 5	
Read Current Row	Insert + Shift + ↑	
Read from Start of Row	Insert + Shift + Home	
Read to End of Row	Insert + Shift + Page Up	
Read Current Column	Insert + Shift+Num Pad 5	
Read from Top of Column	Insert + Shift + End	
Read to Bottom of Column	Insert + Shift + Page Down	
*NVDA Combines moving and reading		

Forms

Description	JAWS Command	NVDA Command
Form Quick Key	F	F
Button Quick Key	B	B
Enter Forms Mode	Enter (in a form element)	Enter or NVDA + Space (in a form element)
Navigate to Next form Control	Tab	Tab
Navigate to Previous Form Control	Shift + Tab	Shift + Tab
Select and Deselect Checkboxes	Spacebar	Spacebar
Open Combo Box/ Jump Menu	Alt + ↓	Alt + ↓
Auto Complete		Alt + ↓
Select Multiple List Items	Ctrl + Shift or Ctrl + Spacebar	
Unselect All But Current	Ctrl+ \	
Select Radio Button	↑/↓	
Select Element in Combo Box	↑/↓ or the First letter	↑/↓ or the First letter
Submit Form	Enter (in forms mode)	Enter (in forms mode)

Forms

Description	JAWS Command	NVDA Command
Exit Forms Mode	+ key	NVDA + Space
List of Form Elements	Insert + F5	
Select Radio Button		↑/↓
Checkbox		X
Combo Box		C
Radio Button		R

Frames

Description	JAWS Command	NVDA Command
Move from one frame to the next frame within the page.	Ctrl + Tab	
Move from one frame to the previous frame within the page.	Ctrl + Shift + Tab	
Bring up a list of frames that are present within the page	Ins + F9	

Links

Description	JAWS Commands	NVDA Commands
Jump from link/Form element next one	Tab	Tab
Jump from link/Form element next previous one	Shift + Tab	Shift + Tab
Bring up a list of links within the page	Ins + F7	
Unvisited Link Quick Key	U	U
Visited Link Quick Key	V	V
Next link		K
Elements List - lists page links, headings, and landmarks		NVDA + F7



Feature Comparison

Other

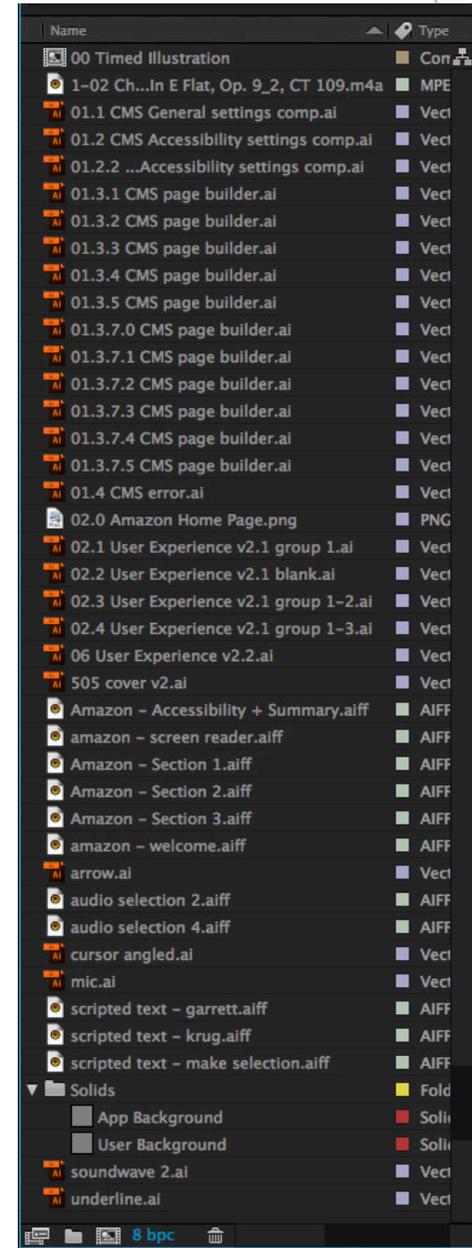
Description	JAWS Command	NVDA Command
Search for a word or a phrase	Ctrl + F	Ctrl + F
Refresh Screen, i.e. repaints all the currently displayed items on the screen	Ins + Esc	
Reformat documents, i.e. reformats multiple column pages to be more readable with speech.	Ins + F5	
Help with current element	Insert + F1	
Keyboard help		NVDA + 1
Next Image		G
Previous/Next Paragraph		Ctrl + ↑/↓
Blockquote		Q
Next key you hit ignores NVDA and is a normal Windows key		NVDA + F2
Speaks characters typed		NVDA + 2

Other

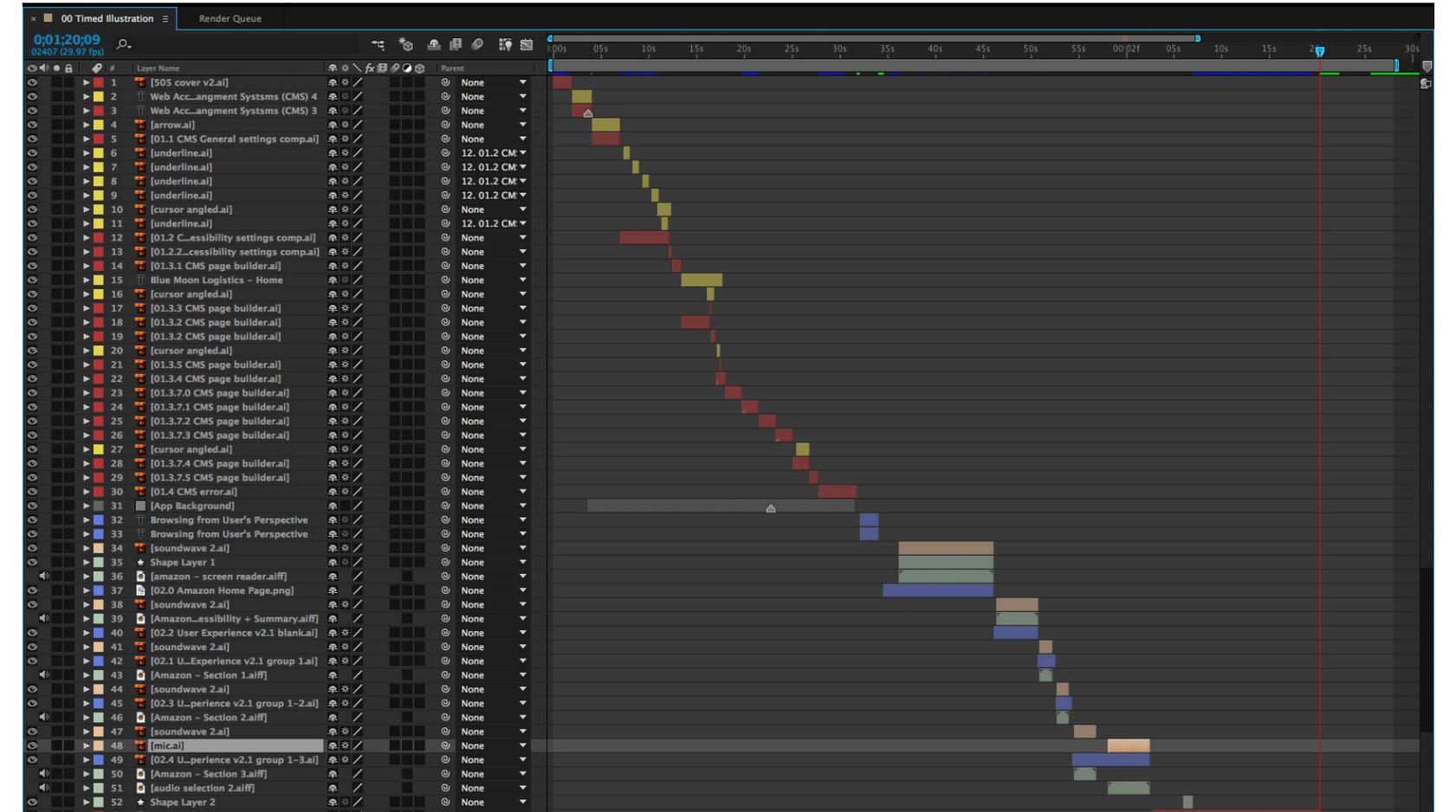
Description	JAWS Command	NVDA Command
Speaks words typed		NVDA + 3
Reads the entire foreground window (useful for reading a dialog box)		NVDA + B
Announces the title of the current foreground window		NVDA + T
Quit NVDA		NVDA + Q

Video Production

After Effects Timed Presentation Assets



After Effects Presentation Timeline





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