Using the Americans with Disabilities Act to Analyze Accessibility-Induced Inequity on the Internet

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On my honor as a University Student, I had neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

Nearly 20 million struggle daily with visual disabilities ("Visual Impairments," n.d.) that make it difficult for them to use the internet to apply to jobs, register to vote, and shop online. On the employment front, 46% of job applicants with disabilities described their application experience as exceedingly challenging, with almost 9% unable to finalize their applications (*Career Websites Must Be Accessible. Is Yours?*, 2019). The human rights violations caused by the inequities of inaccessibility on the internet need to be addressed. According to the Web Content Accessibility Guidelines (WCAG), a series of rules and regulations published by the Web Accessibility Initiative of the World Wide Web Consortium, 96.3% of webpages have some sort of accessibility issue. The Americans with Disabilities Act (ADA) targets this percentage by providing justice to disabled Americans, however it seems to value physical, real-world implication more than inaccessibility on the internet. As seen in Figure 1, the extent to which detail is shared for real-world disabilities is vast. However, the same guidelines for software accessibility fail to provide any images or detailed explanations but rather is just a list of "must-do's" for software companies to follow.

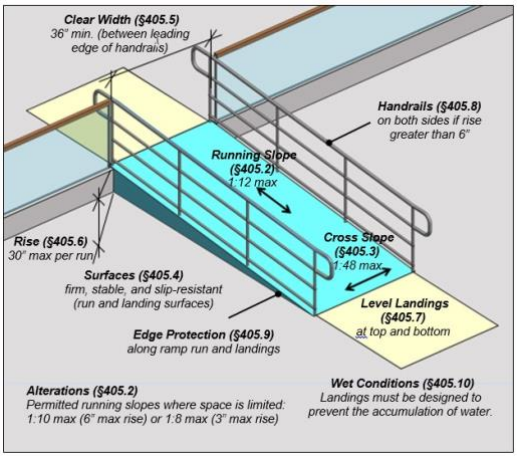

Figure 1: ADA Guidelines for Ramps

This image shows the extent to which detail is shared for real-world disabilities in the ADA, specifically in wheelchair ramps (*U.S. Access Board - Chapter 4*, n.d.)

In *Support for the Americans with Disabilities Act Among Nondisabled People*, Friedman & VanPuymbrouck argue that disabilities are seen as a result of socially created barriers (2023). These social limitations prevent internet accessibility from being seen at the same level as real-world accessibility. In this paper, I argue that the Americans with Disabilities Act can be used as a lens to understand how to improve internet accessibility for visually impaired Americans.

I. User Experience Design and Testing

Important Terminology in Context

Before discussing accessibility, it is important to discuss the processes in which the users' needs should be developed. There are multiple actors in the processes involved including User Interface and User Experience (UI/UX) designers, software engineers, and project managers.

UI/UX designers focus most of their work on the design thinking process- an approach to solving problems for the customer first. The design thinking process, as seen in Figure 2, can be thought of a cycle that consists of multiple different stages. The first step is the "empathize" stage where designers put effort into understanding the customer, their wants and needs, and what problems they have. This stage provides designers with a baseline understanding of who their customers really are. Next, designers define the actual problem statement and ask themselves the question: "What problem are we trying to solve?" In the "define" stage, designers identify a problem that they will attempt to solve throughout their solution. This stage is vital as it's important to build a product that not only will people need, but also solves the problems they have. Following the "define" stage, designers will create a list of potential solutions to their problem in a process known as the "ideate" stage. This list of potential solutions is then passed onto the "prototype" stage where the best idea from this list will be prototyped- a process where

the project is mocked up, but not coded as to not waste resources into an idea that could potentially not work. The “test” stage accomplishes exactly this. The prototype is put to work with the target user base to ensure it solves the problem it was set out to solve. The result of this stage is always beneficial. If the prototype is a hit with the test users, then the idea can be refined more and shipped out. However, if not, designers return to the previous stages of the cycle to understand how they can better solve the problem for the users. Design thinking is a very valuable process because it allows designers to “rethink their product offerings, grow their markets, offer greater value to customers, or innovate and stay relevant” (Linke, 2017). Without design thinking, companies would be extremely detached from the lives of their customers and would not be able to provide an experience that satisfies them to their wants and needs out of a product (Han, 2022).

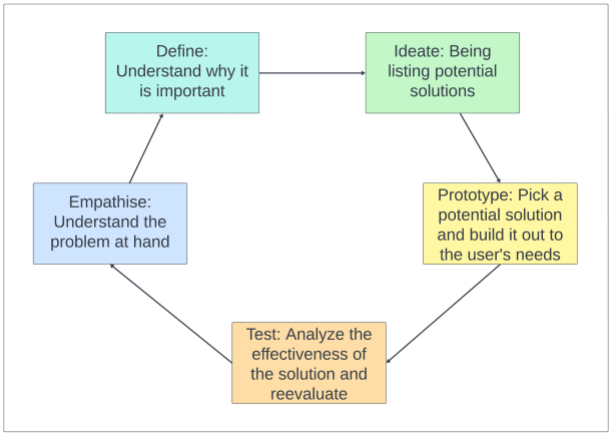

Figure 2: Design Thinking Framework

A framework to describe the process in which designs are created. This process is an integral part of the software development process. (Created by Author)

Rather than focusing on the design process, software engineers focus on the software development lifecycle, or SDLC. The SDLC, as described by the University of Connecticut, provides structure to the development process, ensuring that engineers stay on track to

developing a product (*Home | Software Development Life Cycle (SDLC)*, n.d.). First is the "planning" stage where engineers get together and create "stories" for each of the tasks required for the project. The project will typically follow an "agile" format, which is a method of tracking tasks for a project. In an "agile" project, engineers complete a project in "sprints" that could span from ten to twenty weeks long. During the "planning" stage, each story is assigned to a specific engineer to complete during a sprint. This keeps engineers on track to complete the entire project by the last sprint. Once each of the sprints have been planned, engineers delve into the "design" stage, which consist more of a technical design as opposed to the work the UI/UX designers complete. This technical design can include but is not limited to the types of technologies used, file structure, and more. The results of the "planning" and "design" stages pave a path for the "construction" phase of the SDLC. During "construction," engineers create the product using the setup provided. More simply put, this is when the engineers code the product they set out to build. To ensure that code is not broken or prone to exploitation, the engineers then go through the "integration and testing" stage. This stage consists of testing the working solution to ensure it is up to standards set by the company and engineers. After testing, the software will go thought one last check known as the "functional evaluation" before the final stage of "implementation" where the code is deployed for public use. The SDLC prevents engineers from getting side-tracked and ensures there is always work to be done until the project is complete.

The project manager is responsible for ensuring both processes go hand in hand, and the teams work together to deliver a product that is what they set out to do. In terms of the problem at hand, we see that accessibility is not brought up enough in the design thinking cycle as well as the SDLC. In design thinking, a wide range of potential users are not tested, meaning that the designers do not see the need for accessible features at the end of the process. In the SDLC,

accessible features are either not planned for or are not tested for proper execution before being implemented into the public domain. Not accounting for accessibility in the design process encourages a negative feedback loop putting visually disabled users in a world where 96.3% of websites have some sort of failure as per the Web Content Accessibility Guidelines (WCAG, 2023). In the United States, visually disabled Americans make up 8% of the population, or 20 million Americans. While this may not seem like a large amount of people in the context of the whole population, it is important to highlight the impact of poor web accessibility on the lives of visually disabled individuals. Inaccessible websites can raise inequities on the web by preventing basic human rights like registering to vote, shopping online, or even applying to a job, tasks that able-bodied individuals would not think twice about.

Types of Web Accessibility Failures

To better understand what visually disabled users go through when traversing an inaccessible internet, it is important to understand common types of accessibility failures that may not affect users without visual disabilities. One of the most common problems is poor color contrast between the foreground and background. According to the WCAG, there must be "at least a 4.5:1 ratio between the foreground content and the background content" (*Web Accessibility Criteria - Color Contrast*, 2019) as seen in Figure 3. This is important as color is often used to convey importance as well as simply to share common information. Following the guidelines here increases the quality of the user's experience when searching the web.

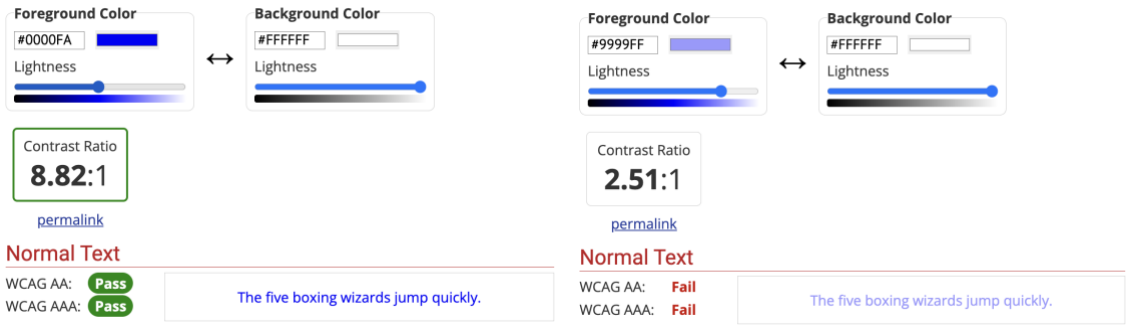

Figure 3: Example of Poor Color Contrast and WCAG Guidelines

This is a screen capture from the WebAIM website, an organization with web accessibility as its mission, showing the difference between good and poor web color contrast as per the WCAG (*WebAIM: Contrast Checker*, n.d.)

Accessible users typically use devices or technologies to help with their visual impairment. This could include using screen readers, the mouse only (as opposed to keyboard and mouse), speech input software, and more (*Types of Assistive Technology | Digital Accessibility*, n.d.). Screen readers are used to read what is on the screen to the user when they are unable to see the content themselves. Yet, these devices only work as intended when used on accessible websites. Thus, with these websites comes a need to follow a standard set of guidelines. This includes using "alt text" on images to describe what is in the image when blind users attempt to read content, captions on videos, using words to describe actions on a website (as opposed to just color), and more (*Guidance on Web Accessibility and the ADA*, 2022).

How the Americans with Disabilities Act Helps

The Americans with Disabilities Act, or ADA, served as a monumental milestone in the process of gaining basic human rights for Americans with Disabilities. Before the ADA, disabled Americans lived in a world full of societal barriers that blocked their basic human rights. The ADA was sparked from the disability rights movement, like the civil rights movement, aimed to challenge segregation of disabled people in the country (Mayerson, 2012). The continued

mistreatment of disabled people and their efforts to fight for their rights eventually made people understand that the segregation of disabled people was a form of discrimination. After years of fighting for their rights, the Americans with Disabilities Act was passed in 1990 and gave disabled Americans the justice they so well deserved.

However, this was not the end of the movement, as web accessibility had become a new realm that needed its own accessible features and regulation. In 1996, the US Department of Justice amended the ADA to ensure it applies to the internet (Groves, 2023). After that in 1973, Section 508 was added to the act to clarify specifications required for creating software. In 1999 and 2008, WCAG 1.0 and WCAG 2.0 were developed and published, respectively. Between the development of the two, and likely a leading cause of WCAG 2.0, Target was sued by the National Federation of the Blind (NFB) for the inaccessibility of its website as per the ADA (*National Federation of the Blind v. Target Corporation < Southeast ADA Center*, n.d.). This was one of the biggest cases related to web accessibility at the time and, more importantly, a step in the right direction for the disabled rights movement.

However, understanding the difference between an inaccessible feature in the real world and an inaccessible feature on the internet is vital to explain to what extent the regulations on the real-world, more developed features of the ADA can be applied to improve the regulation and legislation on accessibility on the internet.

II. Using The ADA for Real-World Accessibility as a Lens for Internet Accessibility

The Americans with Disabilities Act has been established a strong foundation for the real-world applications of accessibility. However, the Internet is still lacking the proper tools required to make all websites equitable for everyone. The difference between physical and internet accessibility issues is that physical issues are seen as a problem with society rather than

the person (Friedman & VanPuymbrouck, 2023). This means that the society the individuals are in care for their well-being and want to see how a solution can mend their problems. Using this lens on internet accessibility can help us see how contributors to the internet can change to improve the wellbeing of those users. Currently, the priority is to make the problems in the real world accessible as fast as possible like when it comes to putting a ramp when there are stairs, adding Braille when there is a sign, etc. The problem at hand is that internet accessibility is not viewed with the same priority as real-world disability even though basic human rights like registering to vote, buying something on the web, or even applying to a job are blocked. I used the real-world accessibility lens, as seen in Figure 4, from the ADA on the internet side of things to understand how to raise priority for web accessibility and enable disabled Americans with the rights they deserve. The burden falls on society to provide each individual equal opportunity to success.

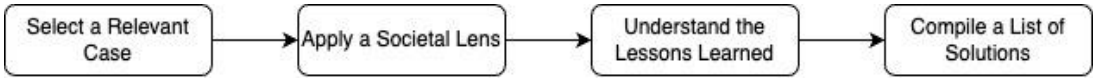

Figure 4: Analytical Method

This flow chart describes my thought process as I address each case in terms of the mindset shifted presented by Friedman & VanPuymbrouck (Created by Author)

Past Examples of Failures in Web Accessibility

There have been multiple cases of large companies failing to uphold the rules set in place by the ADA. Seeing the cases related to technology through a lens of issues being societal rather than personal will help frame the relevant cases and show us how to proceed in the future when something similar happens again.

The Target vs the National Federation of the Blind case was pinnacle in starting the movement towards a more accessible internet. In addition to not including alt text on images, the Target website failed to allow users to make a purchase without the use of a mouse, had poor accessibility to show store maps, and headings that were important to navigate the site were missing (Patel et al., 2009). What is more important however, was Target's lack of action on the case even after the issues were initially raised by the NFB. Looking through the lens of this being a societal problem, Target would have made the changes necessary before a lawsuit had to be filed. Target's lack of action prevented thousands of disabled users from being able to read the site using screen readers, make purchases for their goods, or even navigate the online store properly.

Next, H&R Block, one of America's largest tax companies, was found in violation of multiple different standards set in the WCAG (*Office of Public Affairs | Justice Department Enters Consent Decree with National Tax Preparer H&R Block Requiring Accessibility of Websites and Mobile Apps Under Americans with Disabilities Act | United States Department of Justice*, 2014). Although there was no lawsuit, the U.S. Government cited the company a consent decree, a legal agreement to fix their website, to improve accessible features on their website and app. These included incompatibility with screen reader software, Braille display, keyboard navigation, captioning and more. H&R Block's case is a good example of where society took responsibility for limiting access to features for disabled people. Rather than denying the problems with their software, the company took to collaborating with the NFB and Justice Department to bring their website and mobile app up to speed with the WCAG 2.0. H&R Block understood that the features disabled users could not follow denied them equal access and put

them at a disadvantage when compared to an able-bodied individual using the same exact product.

Next, the Justice Department conducted another consent decree that force Miami University in Ohio to "make significant improvements to ensure that technologies across all its campuses are accessible to individuals with disabilities" (*Office of Public Affairs | Miami University Agrees to Overhaul Critical Technologies to Settle Disability Discrimination Lawsuit | United States Department of Justice*, 2016). As part of the agreement, Miami University agreed to meet with every student affected by the poor web accessibility and understand their wants and needs throughout the process. Once again viewing this through a lens of societal justice, the school, and technologies they use should have included students with disabilities in their testing process from the beginning. For the school, they should have understood who their students were and accommodated accordingly, especially because students spend tens of thousands of dollars on tuition per year. For the companies creating the software the school used, they should have included disabled users in their design thinking and SDLC to ensure that their needs would be accounted for without the need for a lawsuit. By failing to provide students with an equal opportunity, Miami University created an unjust community of learning for disabled students.

Finally, and most recently, Rite Aid entered an agreement with the Justice Department to make its online vaccine registration portal more accessible as per the WCAG. Accessibility during the largest health pandemic in hundreds of years is vital to the development of a fair and just society. Rite Aid's website "was not accessible to some people with disabilities, including those who use screen reader software and those who have a hard time using a mouse" (*Office of Public Affairs | Justice Department Secures Agreement with Rite Aid Corporation to Make Its Online COVID-19 Vaccine Registration Portal Accessible to Individuals with Disabilities |*

United States Department of Justice, 2021). Users who relied on external accessibility tools could not book appointments for vaccines, a flaw that could put hundreds of individuals at risk if they were to fail to get vaccinated. Through the lens of societal benefit, Rite Aid failed to ensure its customers could use the software they created. In addition to disabled users, a large portion of users who use screen readers and keyboard-only input are senior citizens who are most prone to the pandemic and have priority in getting vaccinated.

Software Companies Don't Put Disabled Users First

In the realm of technology and software development, where innovation and functionality often take center stage, there's an underreported but persistent issue—the neglect of accessibility guidelines by software development teams. A fundamental aspect of creating a digital environment that caters to everyone's needs, regardless of their abilities, is the incorporation of accessibility features. However, despite the growing awareness of the importance of accessibility, the reality is that developers frequently do not prioritize accessibility guidelines during the development process.

Over the past three summers, I have had the opportunity to intern at these companies. At each of these organizations, the involvement of a design team in the development of projects, including internal tools, was surprisingly limited. In many cases, accessibility is placed on the back burner since there is a lack of knowledge in the field. According to Bi et al., "Special knowledge on disabilities and standards about accessibility features is required" to develop, and more importantly, maintain accessible features in projects (Bi et al., n.d.). Projects become difficult to manage when there is no one who understands why accessibility features are required in the first place- something a design team can provide insight on.

In the case of Syntrillo, a startup in Charlottesville, the design aspect was particularly telling. As an intern, I was the sole designer assigned to the project. This meant the responsibility for ensuring accessibility and a user-friendly experience largely rested on my shoulders. A similar scenario unfolded at larger companies like Qualtrics and Capital One. As seen in Figure 5 below, these companies were largely the same and had the same goal of using software engineering to accomplish a specific task. Despite the substantial resources and the caliber of these organizations, I found myself tasked with designing and developing tools in environments where the priority was primarily functionality and usability. The teams prioritized getting the job done as opposed to getting it to work for everyone. In essence, "Accessibility issues are often addressed in the later development stages" (Bi et al., n.d.). This is often a result of accessible features being too difficult to maintain, insufficient domain knowledge on the topic, or even accessibility simply not being a part of the entire design framework and software development lifecycle. Throughout my experiences and in the research conducted by Bi et al., accessibility often took a back seat, and the development process did not place significant emphasis on ensuring the digital tools were accessible to a diverse range of users.

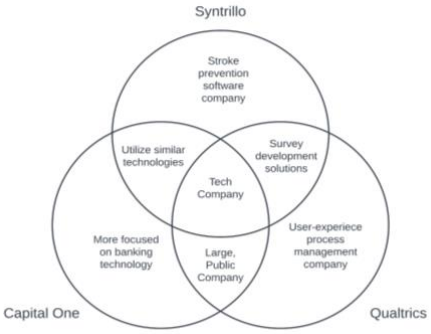

Figure 5: Internship Experience Venn Diagram

This Venn Diagram describes the similarities and differences between the three companies I interned at during my summers as a student at the University of Virginia (Created by Author)

The concern for accessibility was almost entirely absent in these companies unless it was raised by a developer, which never happened. While the commitment to functionality and usability is commendable, it should not come at the expense of accessibility. The evidence presented, although anecdotal, reflects the industry's broader trend, where the pressure often falls on individual developers to advocate for and implement accessibility features. The shift towards prioritizing accessibility in the development process is not only a moral imperative but also essential for ensuring that digital resources cater to the diverse needs of all users.

Seeing Cases Through the Lens

Analyzing these five cases with the lens that Friedman and VanPuymbrouck declared, we can define disability as "a result of socially created barriers to participation" (Friedman & VanPuymbrouck, 2023). By combing through each of the five cases with a society-first mindset, we can see how we should frame out thinking towards solutions and future applications of the Americans with Disabilities Act on Internet Accessibility. From Target, we can see that in the early stages, companies refused to even look through the lens we defined as they denied all allegations of the lawsuit. From the following three cases, we can see how the mindset shifted more towards fixing the problem rather than pointing blame. Finally, from the anecdotal evidence, we can see how the industry's broader trend is heading.

III. Results

Using the Americans with Disabilities Act, specifically its understanding of real-world disabilities, as a frame to find how to improve web accessibility on the Internet proved to be an effective exercise in finding out what is currently wrong in the process. By understanding the specific cases of web inaccessibility from the research approach and tying them back to the

processes by which software is developed in the problem definition, it is clear the problems with the current standing of the process.

First, the main problems from the cases were clear to be rooted in a failure to account for accessible users. From the Target case, accessibility was never a goal at hand. Target's adamance brought them down as they refused to update their site, even after being targeted with a lawsuit to improve their website. With H&R Block it was clear that there was a discrepancy between the regular software and the accessible version, causing inequities for the minority accessible group. Thirdly, Miami University failed to account for its accessible students, who pay tens of thousands to attend, and utilized technology without assistive technologies. Next, Rite Aid had accessibility problems with users that use external assistance like screen readers on a vital platform during the time used for booking COVID-19 vaccination appointments. Finally, I saw these inequities in practice when I was developing products at well-known companies within the industry. Accessibility was never a priority anywhere I worked and never seem like it would be. Herein lies the problem with the entire software creation process, starting with design thinking.

Design thinking is split into five stages to create an effective product; however, many applications of the process forget that it is not simply just five stages, it's a never-ending cycle to help develop an understanding of the customer. What all these companies failed to do is understand their customer base, the severity of their products, and most importantly the inequities and rights violations caused by not making their website equal to use for every one of their users. This discrepancy can likely be sourced to the "Empathize" and "Test" stages. During these stages, teams identify their users, and test built-out prototypes with said users, respectively. However, if the correct users are not being empathized or tested with, this will create a never-

ending negative feedback loop, preventing users in need of accessible features from ever being included in the process.

The Software Development lifecycle, like design thinking, is split up into different stages. The SDLC is different because it takes in the design from the design thinking process and plans work around that design, eventually testing the compatibility with users of the product before deploying it to live servers. However, products that are a result of the SDLC still maintain a bad habit of failing to be accessible to screen-readers, braille monitors, keyboard-only functionality, and many other accessible resources. This is a result of failing to test products on the proper software during the relevant stages. The product can work for everyone except for those in need of accessibility features and it will still be shipped out and deployed to public servers as if it is perfect.

This negative feedback loop is a result of a lack of regulation of the WCAG by the ADA and the US Department of Justice. Although the DOJ has done a decent amount to understand how to implement accessibility features into modern day websites, the failure lies in the ADA itself by not placing a check on the Title II (State and Local governments) and Title III (Public businesses), they are able to create software they think passes design checks. This allows companies to take advantage of the entire process. In the future, companies should be mandated to provide a report on the demographics of people they tested with in addition to a list of assistive technologies they ensured work on their website. This could prevent any case like the ones described in the research approach from ever happening again.

Conclusion

From a common perspective, software development is a growing field that shows no signs of slowing down any time soon. However, taking a closer look at the step-by-step process and viewing the problem from a physical accessibility issue lens, many cracks are revealed in the process that was thought to be set in stone. Through the research conducted and cases analyzed during this process, we can see disabilities should be seen as a problem society should fix rather than something wrong in the individual themselves. To achieve this goal, the Americans with Disabilities Act served as a framework to analyze the past and apply it to the future. The ADA serves as a good lens to understanding how to improve internet accessibility and revealed three key problems with the current approach: accessible users are not accounted for in the design thinking process nor the SDLC, assistive technologies are not used in testing, and accessibility is usually the lowest priority.

There do exist some limitations with this approach, however. This approach assumes that a solution could be that companies will dedicate the time to revamp their design thinking approach and SDLC. It is a daunting task to take on large companies and their established processes, however, it is vital to understand that these processes are flawed and millions of Americans who need to use these technologies cannot as a result. It is vital for all actors within the network to act to spark change, and eventually, a movement to revamp the development process to include more acknowledgment for accessibility standards.

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