Designing an Integrated Real-Time Web Accessibility Assessment Tool for Inclusive Development

A Sociotechnical Approach to Inclusive Digital Design

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

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Introduction

In the digital age, websites and online platforms have become essential resources for information, services, and community engagement. Ensuring web accessibility, which allows people with disabilities to access and fully participate in online spaces, has therefore become a pressing sociotechnical challenge. Accessibility is crucial for inclusivity, yet many websites still present barriers due to limited awareness, resources, or the technical difficulties of implementing accessibility features (World Wide Web Consortium [W3C], 2018). These barriers create a digital divide that excludes millions from essential online interactions, contradicting societal commitments to equity and inclusion. Guidelines like the Web Content Accessibility Guidelines (WCAG) from the World Wide Web Consortium and legal standards such as the Americans with Disabilities Act (ADA) provide frameworks for accessible digital design, but compliance remains inconsistent (U.S. Department of Justice, n.d.). Addressing web accessibility serves not only the specific needs of individuals with disabilities but also society's broader goal of creating a universally accessible internet (Robles v. Domino's Pizza, LLC, 2019).

To address these accessibility challenges, my technical project focuses on developing a real-time web accessibility assessment tool. This tool aims to help developers identify and resolve accessibility barriers as they design, providing immediate, actionable feedback that aligns with WCAG standards. By offering real-time feedback within development environments, this tool will lower the technical barriers to integrating accessibility, allowing developers to create more inclusive digital spaces that benefit users, businesses, and regulatory bodies (Deque Systems, n.d.; Google Developers, n.d.).

Complementing this technical approach, my STS research investigates the social implications of accessibility through Langdon Winner's (1986) Technological Politics framework, which considers how design choices in technology reflect societal values and power structures. The 2019 Domino's Pizza lawsuit, in which the company faced legal action for its inaccessible website under the ADA, provides a case study illustrating the broader implications of accessible design (Robles v. Domino's Pizza, LLC, 2019). This case emphasizes the ethical and legal responsibilities of companies to ensure accessible digital experiences and highlights how technology can either include or exclude users based on design decisions (U.S. Department of Justice, n.d.). Analyzing this case helps to clarify the societal stakes of accessibility in digital design, emphasizing the importance of integrating social considerations into technical solutions.

Since the challenge of web accessibility is fundamentally sociotechnical, addressing it requires attention to both technical solutions and social understanding. This prospectus presents a technical project proposal for developing a real-time accessibility assessment tool and an STS research proposal that examines the societal stakes of accessibility using the Domino's case. Together, these projects aim to contribute to a more inclusive internet designed to accommodate all users.

Technical Project

Web accessibility remains a significant challenge as many websites fail to meet accessibility standards, creating barriers for users with disabilities. This technical project aims to develop a real-time web accessibility assessment tool to address these accessibility barriers by enabling developers to identify and correct accessibility issues during the design process. The

tool will address common accessibility issues such as insufficient color contrast, improper screen reader compatibility, and lack of keyboard navigation support. When left unaddressed, these issues prevent users with disabilities from engaging with digital content, which limits their ability to participate fully in online spaces (W3C, 2018; Deque Systems, n.d.).

Current accessibility tools, including Axe, Lighthouse, and the Web Accessibility Evaluation Tool (WAVE), aid in evaluating accessibility; however, they primarily perform post-development audits (Deque Systems, n.d.; Google Developers, n.d.; WebAIM, n.d.). These tools generate reports on accessibility violations, but they often require developers to exit their design environments to interpret complex feedback and make manual adjustments. This post-design approach can disrupt workflows, particularly for developers unfamiliar with accessibility requirements, and identifying issues post-development can result in delayed fixes, increased costs, and time-consuming revisions (W3C, 2018).

The limitations of existing tools lie in their lack of integration with real-time design and development workflows. By auditing designs only after development, these tools leave accessibility issues unaddressed during critical stages of design. This often results in websites that are inaccessible by the time they reach users, especially when developers work under tight timelines or budget constraints (Deque Systems, n.d.). Without a seamless method for evaluating accessibility, developers may inadvertently deprioritize accessibility, exacerbating the problem of inaccessible design (Google Developers, n.d.).

The proposed tool will provide real-time feedback within development environments, empowering developers to address accessibility issues as they arise. This shift makes it more feasible for developers to follow WCAG standards and integrate accessibility from the outset.

For end-users, especially those with disabilities, this tool represents a step toward a more inclusive digital experience by ensuring accessible websites are created from the initial stages of development. For companies, real-time compliance checks will potentially reduce the costs and legal risks associated with non-compliance with the ADA (Robles v. Domino's Pizza, LLC, 2019).

This real-time web accessibility assessment tool offers a solution that bridges the gap between accessibility standards and practical design processes. Its in-line feedback model will serve as both a guide and an educational resource, supporting developers in creating accessible digital content more efficiently. The tool is designed to assist both experienced and novice developers, thereby broadening the scope of inclusive web development (Deque Systems, n.d.; Google Developers, n.d.).

This project will draw on web development expertise, particularly in JavaScript and web accessibility frameworks such as Accessible Rich Internet Applications (ARIA). By implementing ARIA tags, the tool will enhance screen reader usability and ensure appropriate interactive elements are compatible with assistive technology. WCAG guidelines will inform the tool's core features, particularly for visual and navigational accessibility (W3C, 2018). Testing methods will include both automated accessibility checks and manual evaluations with assistive technology users, ensuring comprehensive usability.

To demonstrate the tool's viability, data will be collected from usability tests with developers and end-users who rely on accessible web interfaces. Feedback will be gathered on ease of use, accuracy, and the impact of real-time feedback on accessibility outcomes. Additionally, comparative data from post-development audit tools will be analyzed to highlight improvements in workflow efficiency and compliance. This evidence will support the tool's

potential to not only streamline the development process but also contribute to a more accessible internet (W3C, 2018; WebAIM, n.d.).

STS Project

The social dimensions of web accessibility have gained attention as individuals with disabilities encounter barriers in accessing online resources. This STS project examines the 2019 Domino's Pizza lawsuit, where the company was sued under the ADA for failing to provide an accessible website for visually impaired users. The court's decision reaffirmed that digital spaces, like physical spaces, must be accessible to all users, setting a legal precedent for ADA compliance in online environments (Robles v. Domino's Pizza, LLC, 2019). This case study raises the question: How do web accessibility decisions reflect societal values and power structures, as described in Langdon Winner's (1986) Technological Politics?

Scholars and legal experts have analyzed the Domino's case primarily from legal and regulatory perspectives, focusing on how ADA compliance applies to digital spaces. Many analyses explore the implications for businesses, highlighting the potential legal liabilities for companies failing to comply with accessibility standards. Some argue that the case demonstrates a need for companies to prioritize accessibility in their digital products, framing it as both a legal obligation and an improvement in customer service (U.S. Department of Justice, n.d.). However, these perspectives tend to overlook how technical design decisions in web development can perpetuate societal exclusion by systematically limiting access for certain groups (Deque Systems, n.d.).

While the current literature offers valuable insights into the legal and operational implications of web accessibility, it falls short of addressing the deeper social dynamics that

underpin these decisions. Technological Politics, a framework that examines how technology design choices reflect and reinforce social power structures, provides a lens to explore web accessibility as a matter of social justice rather than solely compliance. This framework highlights how technological designs affect relations of power and privilege among groups of people by advantaging some while marginalizing others. Viewing accessibility decisions in this light reveals how inaccessible designs can perpetuate exclusionary practices, maintaining social inequalities by marginalizing people with disabilities (Winner, 1986).

This analysis offers a new understanding of the Domino's case by framing accessibility decisions as issues of social justice. Through Technological Politics, inaccessible design choices are positioned as barriers that enforce social inequality. Without adopting this perspective, stakeholders may continue to see accessibility as optional, rather than a fundamental part of digital inclusivity and equity. This approach encourages developers, businesses, and policymakers to treat accessibility as an essential design element with significant social implications (Robles v. Domino's Pizza, LLC, 2019).

By examining the Domino's lawsuit through Technological Politics, this research argues that inaccessible web designs function as forms of social control, restricting access for people with disabilities and reinforcing social hierarchies. This analysis invites readers to adopt a new perspective on accessibility: as a social obligation that integrates ethical considerations into the design process. Accessible design should not be viewed merely as a regulatory requirement but as a core aspect of inclusive digital spaces that promote equitable participation in society (Winner, 1986).

Langdon Winner's (1986) concept of Technological Politics provides the conceptual framework for this analysis. This framework helps illuminate how inaccessible technology contributes to societal exclusion. By applying this framework to the Domino's case, it is possible to understand how inaccessible technology contributes to societal exclusion and how accessible design could challenge these dynamics by fostering inclusivity in digital spaces.

Conclusion

The technical and STS projects proposed in this prospectus address the sociotechnical challenge of web accessibility. The accessibility assessment tool technical project will help developers detect and resolve accessibility issues during development, promoting adherence to WCAG standards and fostering more inclusive digital design. The STS project, using Winner's (1986) Technological Politics framework, examines the social implications of accessibility through the 2019 Domino's Pizza lawsuit, illustrating how inaccessible web design can reinforce social exclusion. Together, these projects offer both a technical solution and a critical social perspective, advancing a vision for digital spaces that ensure equitable access for all users.

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