Thesis Project Portfolio

Software Engineering: Providing Organizations with Cost-Saving Recommendations

(Technical Report)

Techlash and Public Perceptions of Big Tech: Analyzing the Differing Perspectives of Techlash Between Scholarly Research and Mass Media

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

Alexander Williams

Fall, 2023

Department of Computer Science

Table of Contents

Sociotechnical Synthesis

(Executive Summary)

A Comparative Analysis of Scholarly Research vs. Mass Media Perspectives on Techlash,

Coupled with Technical Writing Exploration on Innovative Software Development

"Any sufficiently advanced technology
Is indistinguishable from magic" – Arthur C. Clarke

As artificial intelligence (AI) gains traction across all industries, one reoccurring question continues to be asked. What ethical considerations are being accounted for and forgotten during the training of AI models? The latter part of this question is part of a movement focused on holding big tech companies accountable for their actions, otherwise known as techlash. After minimal research, it was obvious there were significant differences in the narrative portrayed regarding techlash between scholarly research and mass media. To address these differences, I set out to perform a discourse analysis on the scholarly research and media coverage of techlash. This research provides lawmakers with information on how to understand the similarities and differences between the two types of literature in order to draft legislation relating to the techlash movement. Although not closely related to the topic of techlash, my technical project was focused on innovative software development as I showcased a cost-saving recommendations platform that I developed during my internship. As mentioned, the relationship between my STS research project and my technical capstone is not very obvious at first glance. however, the STS project is focused on the external side of the technology industry from a consumer and legislator

perspective, whereas, my technical capstone is first-hand experience from the internal side of the technology industry which involves innovative software development.

The technical portion of my thesis produced a synthesis of a software development project I developed during my internship last summer. My project was split into two subprojects, the first of which was a data pipeline. A data pipeline is a solution for ingesting raw data from various data sources to clean and aggregate before placing it into a database. The pipeline was developed using C# and the .NET framework and the cleaned data was placed into a NoSQL database. The second portion of my project was a full-stack feature for a web application (a website that allows users to manipulate data). The feature for the full-stack web application was used to introduce important cost-saving recommendations to services within the company to reduce operating costs and utilization of excessive resources. The back-end work of the feature was done using C#, .NET, and a NoSQL database solution to handle a series of application programming interface (API) calls that would gather the necessary data to display the recommendations on the front end of the portal. On the front end, development was performed utilizing Angular, Node.js, and TypeScript to display the recommendations for users. The completed solution gave the technology company the ability to save well over $100,000 a year in operating costs among various services internally.

In my STS research, I sought to explore the similarities and differences in representation of the techlash movement between scholarly research and news media coverage. The results of my research and discourse analysis suggested that scholarly research focuses on the holistic view of techlash including how the movement can inhibit innovation and introduces ideas for how we can repair the issues within the technology industry without fighting to eliminate it. This perspective differs from the patterns I recognized within the news media which tended to show

the positive aspects of the techlash movement in order to evoke an emotional response from the audience. The final piece of my STS research was combining the information from the analysis I received and the results I had devised to provide a series of justifications in which the impact of my research will have on policymakers looking to introduce legislation on big tech companies.

Upon completing the STS research project and my technical capstone, I realized that the knowledge surrounding ethical responsibility in engineering and analyzing sociotechnical systems allowed me to perform STS research on the techlash movement effectively. From simultaneously analyzing the technologies these companies produce to the consumers and management interacting with the products, to the ethical beliefs and morals that have been challenged by some companies, I was able to understand the various effects that techlash has on society for better and worse. Being able to analyze the situation through the lens of a researcher I was able to focus on highlighting the importance of ethical responsibility in engineering and see firsthand the effects that can happen when ethics are pushed aside in cases like the lack of regard from big tech companies. As an engineer, I have learned it is our responsibility to uphold the rules of ethical responsibility and be able to determine the impact our work will have on not just the direct consumer but society as it is part of a complex and moving sociotechnical system. This newfound knowledge taught me the importance of considering my ethical responsibility in my work as a software engineer to promote human well-being and earn the trust of the consumers that I develop products for.