THE INTERN EXPERIENCE WORKING IN SOFTWARE DEVELOPMENT

THE EFFECT OF SOCIETY, ECONOMY, AND GOVERNMENT ON THE TECHNOLOGY SECTOR

A Thesis Prospectus
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By
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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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Software development is one of the fastest growing jobs in the United States, and the Bureau of Labor Statistics expects a growth rate of 26% over the next decade—over three times the national average (Occupations with the most job growth, 2022). As the technology industry grows and new technological innovations like the new iPhone 14 and MacBook Air are integrated into society, more people find themselves investing in the future of technology. Furthermore, large tech companies are also competing among each other, trying to come up with new products that will outperform others, like the all too well-known Samsung versus Apple debate. This cycle of influence between technology and society continuously repeats itself, and the field of technology finds "not just simple exponential growth, but 'double' exponential growth, meaning that the rate of exponential growth is itself growing exponentially" (Kurzweil 42). As new companies are built and old tech companies attempt to scale with this 'double' exponential growth, the United States has accumulated over 585,000 tech companies, leading with the largest technology sector in the world. This endlessly increasing demand for workers puts an immense amount of pressure on the software developers in these companies who are writing code, designing apps, and creating new products. Additionally, societal expectations and competition between tech companies force software developers to maintain high standards and expectations, while simultaneously working more efficiently than ever before. This naturally leads to unhealthy work-life balance, increased stress levels, and mental health issues in the worst case. Moreover, as more software developers practice these unhealthy work habits, they become normalized and expected, forming a toxic work environment and unhealthy company culture.

The technical research and tightly coupled STS research proposed in this prospectus address these issues in the growing field of technology. The technical research will examine the

work-life balance of software development interns in the technology industry and identify the primary factors in the company culture and work environment that negatively impact the mental health of these individuals. The paired STS research will focus on how technology has shaped the work culture in the technology industry. More specifically, the STS research will analyze how the advancement of technology has negatively affected the lives of employees working in the field of technology, and various economic and social factors that have contributed to this unhealthy accelerated growth of technology. The STS research will use the System in Context Framework to analyze how the factors in the social context negatively affect the system that is the work culture in the technology industry. This technical and STS work will be accomplished during the Summer 2022, Fall 2022, and Spring 2023 semesters, a total of 40 weeks.

THE INTERN EXPERIENCE WORKING IN SOFTWARE DEVELOPMENT

During the summer of 2022, I worked as a software development intern at Amazon working in the department of Amazon Web Services on the Elastic Block Storage team, where I and many other college students were able to gain experience working as a software developer. Amazon's internship experience was rather lackluster, and people tend to have a very difficult time as an intern, since they need to meet high job expectations. At the start of the internship, every intern was assigned to their own team of 6 to 10 full time software developers and given a technical project to complete during their 12 weeks with the company. Throughout the internship, interns would be seen under a lot of work stress, and in the worst cases, even crying at times. People would also frequently be spotted working overtime, as some interns and full-time employees would stay at the office until the closing time before packing up and going home. Skipping breaks to attend meetings was another issue that quickly became accepted and normalized. Moreover, Amazon has their own cafeteria where people would frequently eat and

hold meetings simultaneously, which only exacerbated the issue. This unhealthy work balance also raises physical and mental health issues for individuals, as shown in Figure 1. Many people working in information technology already suffer from health diseases, and a stress score of 300 or higher indicates a high risk of illness and a stress score of 150 or higher indicates moderate risk (Padma, 2015). The purpose of this technical research will be to examine unique aspects of company culture at tech companies and their negative or positive contributions to the mental health of software development interns. This will be done through analyzing different experiences of individuals who interned as software developers over the summer of 2022. This time frame is important because internships started to become in-person again, and company culture is better reflected when people work in-person in the company environment rather than remotely. It is important to target work-life balance in-person because, company culture that supports positive work-life balance has "a direct negative effect meditated by negative work-home interaction" (Nitzsche, 2013), indicating that dynamic of work-life balance is drastically different for in-person, hybrid, and remote work. The research will be conducted through interviewing interns who worked in an in-person work environment and obtaining information about the work-life balance, integration into team environments, project workload, learning curve, intern events hosted by the company, and other stressors that impacted their mental health. The research interviews will be conducted independently, and the reports will be written under the advice of Associate Professor Briana

Disease	Stress score-average	Percentage
Diabetes	240	10
Hypertension	260	22
Dyslipidemia	320	36
Musculoskeletal	130	56
Depression	180	54
Obesity	340	60

Figure 1: Health problems and stress scores in Information Technology employees. This figure depicts stress scores for employees with different diseases. (Padma, 2015).

Morrison during the Spring 2022 semester. The anticipation of this research is to find strong correlation between the company work culture and the mental health issues in software development interns. Additionally, this research also serves to analyze the unique qualities in work cultures between different companies, comparing corporations at the forefront of technological development to smaller startups. These trends will provide more insight into the dynamics of work cultures in different corporations.

DESIGN OF RESEARCH INTERVIEWS WITH SOFTWARE DEVELOPMENT INTERNS

Students pursuing a career in computer science will typically seek opportunities for real life work experience at large technology corporations for the summer of their 2nd and 3rd year at the University of Virginia. However, 3rd year computer science students tend to find much more success in acquiring internships than 2nd year students. This is mainly due to the 2nd years' lack of computer science knowledge on core concepts like algorithms and data structures, which most if not all 3rd year computer science students have. This research will only include rising 3rd year computer science majors in the College of Arts and Science and the Engineering School at the University of Virginia.

The primary objective of conducting research through interviews with 3rd year computer science majors is to identify their experience with the work culture at different corporations, their individual work challenges that they faced, and how much of an impact these challenges had on their overall internship experience. Through conducting interviews and surveys, the hope is to qualitatively identify primary stressors for interns and why or how they come to fruition. After formulating research questions and getting the research project approved by the International Review Board through the University of Virginia, 3rd year computer science students who

participated in internships during the summer of 2022 and are willing to engage in interviews will be able to provide feedback and insight into their internship experience.

THE EFFECT OF SOCIETY, ECONOMY, AND GOVERNMENT ON THE TECHNOLOGY SECTOR

The field of technology is growing faster than before, and it doesn't seem to be slowing down anytime soon. While society continues to adapt to new technological advancements and the market and economy thrive, "the support for 'high tech' in the business community, and in particular for software advancement, has grown enormously" (Kurzweil 47). Technology is widespread, as more communities are integrating it into their spheres of influence. This growth also increases demand for diverse technology, and "there are tens of thousands of projects advancing the various aspects… in diverse incremental ways" (Kurzweil 46). In some aspects, it seems like technology is adapting faster than society, as news articles appear everyday discussing new innovations in biotechnology, like precision robots performing surgeries, or commercialized space travel in the near future. However, there is also a side of technology that is struggling to keep up with societal expectations. Small companies and start-ups all attempt to achieve "rapid financial success through competitive innovation in creating IoT [Internet of Things] technologies" (Ustek-Spilda, 2019). However, there is also a common expectation that "the majority of them will fail within two years after launch" (Ustek-Spilda, 2019). The technology sector is growing so rapidly that small companies struggle to adapt to the rapid changes in society or compete against the large corporations and tech giants. This doesn't just include small tech companies though. The danger of a shrinking sphere of influence is also a real concern for large corporations as well. Even in big tech corporations like Amazon, Google, and Apple worry about losing their place in society. In fact, large corporations "monopolize

knowledge while outsourcing innovation steps to other firms and research institutions" (Cecilia, 2022) in order to create what is known as an intellectual monopoly, just to stay at the front of the technology sector. This also puts pressure on individuals working in the field of technology, as they have to achieve progress at a faster rate than anyone else. Additionally, much of this outsourced work is in the form of temporary, unstable job opportunities. For example, at Google, outsourced workers tend to be "replaced with new temp workers or take a six-month break before returning to a similar role for another term"(Temps in tech, 2021). Other issues regarding workers in the field of technology such as unhealthy work culture and employee privacy invasion also generate public criticism against these corporations and their treatment of workers. However, there is limited research that dives deeper into the issue. Corporations are being blamed for harsh work-life balance and poor work culture, but it is a network of the government, economy, society, and the technology sector as actors in a network that heavily exacerbates these issues.

Through a study of the recent issues regarding unfair worker treatment in big tech, the effect of the government, economy, and society will be investigated. This will be conducted through the use of the System in Context STS Framework. In the system depicted in Figure 2, each group plays a vital role in the network. The government,

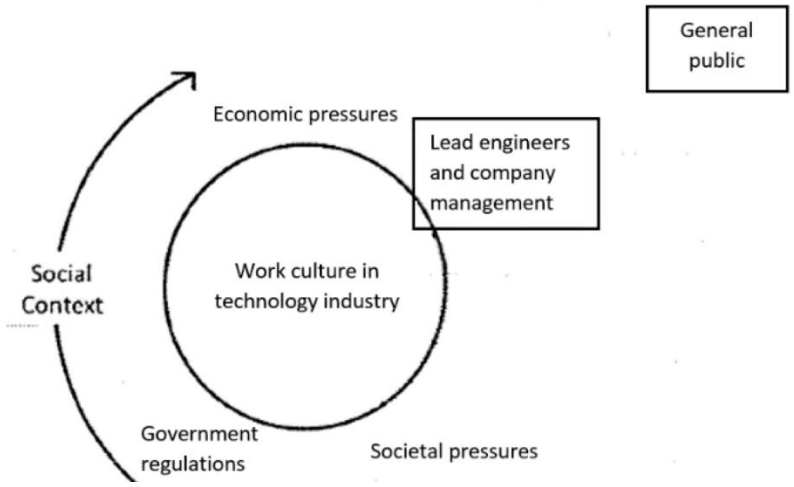

Figure 2: System in Context of the Work Culture in the Technology Industry. This figure depicts various factors in the social context that affect the work culture in technology. (Adapted by Fu (2022) from Carlson, 2009).

economy, and society all impact the direction that technology grows and the speed of its growth. These groups provide answers for the concerns with the current and future development of the technology sector. Societal pressures include societal expectations of technology to continue to grow. For example, the general public and most consumers expect Apple to continue to release new generations of iPhones annually, which puts pressure on the company to continuously come up with new designs and innovate new technologies. This example of a societal pressure puts stress on researchers who have to innovate ideas and come up with new products. As technology grows more rapidly, engineers will suffer more from this constant expectation of accelerated growth. Economic pressures encompass all of the stress on the system, as it is the primary reason that there is such high competition between tech companies and a desire for companies to expand their spheres of influence. Businesses need to make money, and they are more likely to succeed if they have a larger and more powerful work force. This puts immense stress on employees to work harder and to maintain dedication to their respective companies. Employee monitoring is also another largely criticized practice in all work now, due to how much people rely on technology and how far technology has come to give us these capabilities. Within the system in the context, the gatekeepers apply an additional pressure on the work culture and environment by surveilling employees, including worker data collection, anonymous work

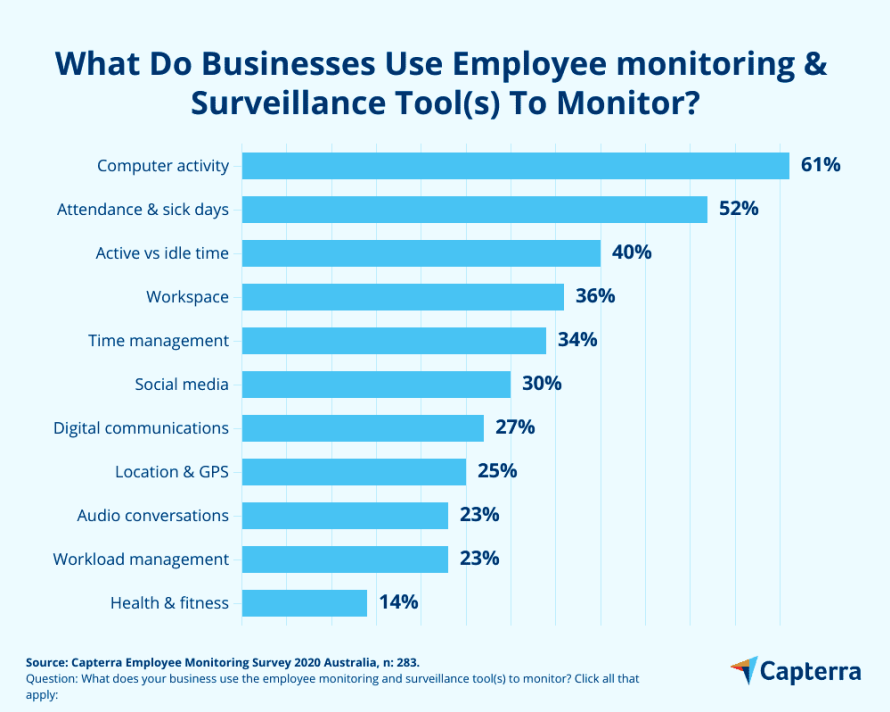

Figure 3: Employee Monitoring Survey Statistics. This figure depicts various uses for employee monitoring in different businesses (Employee Monitoring Survey Statistics, 2021).

evaluations, and hidden algorithms to analyze worker productivity. In Figure 3 on the left, a survey was conducted to find different purposes for monitoring employees. The monitoring has some acceptable and normal surveillance like workload management, attendance & sick days, and computer activity. However, it also contains some much more invasive information like 23% audio conversations, 30% social media, and 25% location & GPS, which is a surprisingly high proportion of monitoring that many would consider as invading their privacy. For technology to be so advanced that this kind of monitoring is even possible becomes very terrifying for many. This research project will be a scholarly article outlining the relationship between the technology sector and other forms of influence. The anticipated outcome of this research is to identify how different actors are influencing the technology sector down a dangerous path that involves unhealthy work environments, poor worker treatment, and other heavily criticized issues in the field of technology.

As the technology industry continues to grow and more students are steering towards a path in computer science, poor work-life balance and strict company culture is being normalized

and more widely accepted. Individuals working in technology are more easily replaceable than ever before. Additionally, problems with employee surveillance, anonymous work evaluations, and long work hours have become more popular in recent times. Sources of these issues can be traced back to not only the corporations that facilitate these work environments, but also societal expectations, economic growth, and even government regulations that impact the way corporations operate. It is important to steer the path of technological innovation in a direction towards healthy growth that allows it and its surrounding social context to adapt to each other instead of allowing the growth to accelerate too rapidly out of control. "Neither an automobile nor a conversation nor an emerging technology can be steered properly if it is moving too fast for those nominally in charge to learn and adjust on the basis of feedback" (Sarewitz and Woodhouse 79). Society must adapt to new progress in technology, and technology must slow down so that society can more sustainably adjust to its growth.

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