

## Impact of Covid on Software Engineering

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## **Executive Summary**

The COVID-19 pandemic has altered almost every single aspect of our lives, from how we interact with our neighbors to how we go about getting groceries. Everyone one of these changes, no matter how minute, is having jarring effects on every industries. As a prospective software engineer this couldn't be truer. With a work force already extremely digitalized, companies who employ software engineers are more likely to keep them home causing adjusted levels of interaction and efficiency. The needs of consumers are also evolving at rates much higher than before the pandemic, causing software engineers to develop solutions for both end customers and businesses at rapid rates. These changes, along with being slated to enter the workforce within a year, are causing me to realign certain goals and determine how I can establish myself in a post COVID-19 workplace.

## **Introduction and Objectives**

In early 2020, SARS-CoV-2 began spreading at a rapid rate and the COVID-19 pandemic began. The pandemic put most everyone around the world into lock downs and under stay-at-home orders. In the United States, this resulted in the temporary closure of non-essential businesses, allowing anyone who could work at home to do so but putting those who couldn't temporarily out of work. This changed the ways that business was done entirely as all face-to-face interactions were relegated to conferencing software such as Zoom or Microsoft Teams and companies were forced to create new systems to keep up with the new needs of the consumer. More than a year after the start of the pandemic, vaccines are finally starting to reach the general population in the United States and things are starting to get back to normal, but certain elements, first adopted out of a necessity of safety and convenience during the pandemic, might be here to stay.

I am currently on track to get my Bachelor and Master of Science degrees in computer science, with the plans to take a position as a software engineer after I graduate. Software engineering is a field that is always on the cutting edge of change, so the changes ushered in by the COVID-19 pandemic just accelerated the rate of these changes and forced slacking companies to adapt. In this report, I will discuss changes facing the software development industry and how those changes will affect my personal goals as a software engineer. I will also discuss how I plan to develop myself as an engineer and a leader under these new circumstances.

## **Physical Untethering**

Before the COVID-19 pandemic, less than 20% of employed adults whose job could feasibly be done from home did so (Parker, Horowitz, & Minkin, 2021), but at the start of the pandemic almost all office jobs began working remotely. Over a year later it is finally common to hear that people are returning to their physical office locations, but returning to work does not

always mean the same thing. Some of the employees who are returning to their offices are going into their offices every day of the week while others are only traveling to their offices a few days a week. This difference in terms of office work arrangements is likely going to stick and company work locations policies will be pivotal parts of the hiring process for years to come.

|                               | Survey 1 | Survey 2 | W1  | W2  | W3  |
|-------------------------------|----------|----------|-----|-----|-----|
| Significantly more productive | ■ 8%     | ■ 11%    | 13% | 10% | 10% |
| More productive               | ■ 22%    | ■ 26%    | 23% | 28% | 26% |
| About the same                | ■ 32%    | ■ 32%    | 31% | 30% | 34% |
| Less productive               | ■ 32%    | ■ 26%    | 26% | 26% | 24% |
| Significantly less productive | ■ 6%     | ■ 6%     | 7%  | 6%  | 6%  |

**Figure 1.** Software Developer Efficacy Survey (Ford et al.)

Survey 1 was completed 2 weeks into initial work from home mandate, Survey 2 was completed

3 weeks later

A majority of the major technology companies, like Spotify and Twitter, are not rushing to force their employees back into their office spaces. Twitter says that they do not plan to ever mandate their employees return to any of their offices worldwide. While the COVID-19 pandemic has forced most workers to work from their homes, Twitter hopes that in the future their employees will work from locations where they feel they can work most comfortably and efficiently whether it be at the office, at home, or on the go (Lerman, R.J.). Putting less constraints on workers allows employees to more flexibly use their time on and off the clock, allowing greater employee satisfaction (Ford et al.) and productivity. This productivity can be validated via employee sentiment and performance numbers, according to the group of employees surveyed in Figure 1, they believe that they have become better remote workers as their original work from orders persisted and they became more comfortable with remote work. While employee sentiment is

important, Fifth Third development teams operating under scrum ideology have seen up to a 25% increase in sprint point output since going remote (Carlson, D.). Using Twitter and Fifth Third as a case studies, working from home, or at least the option too, is most likely here to stay since it provides workers with a greater flexibility and doesn't hamper their efficiency.

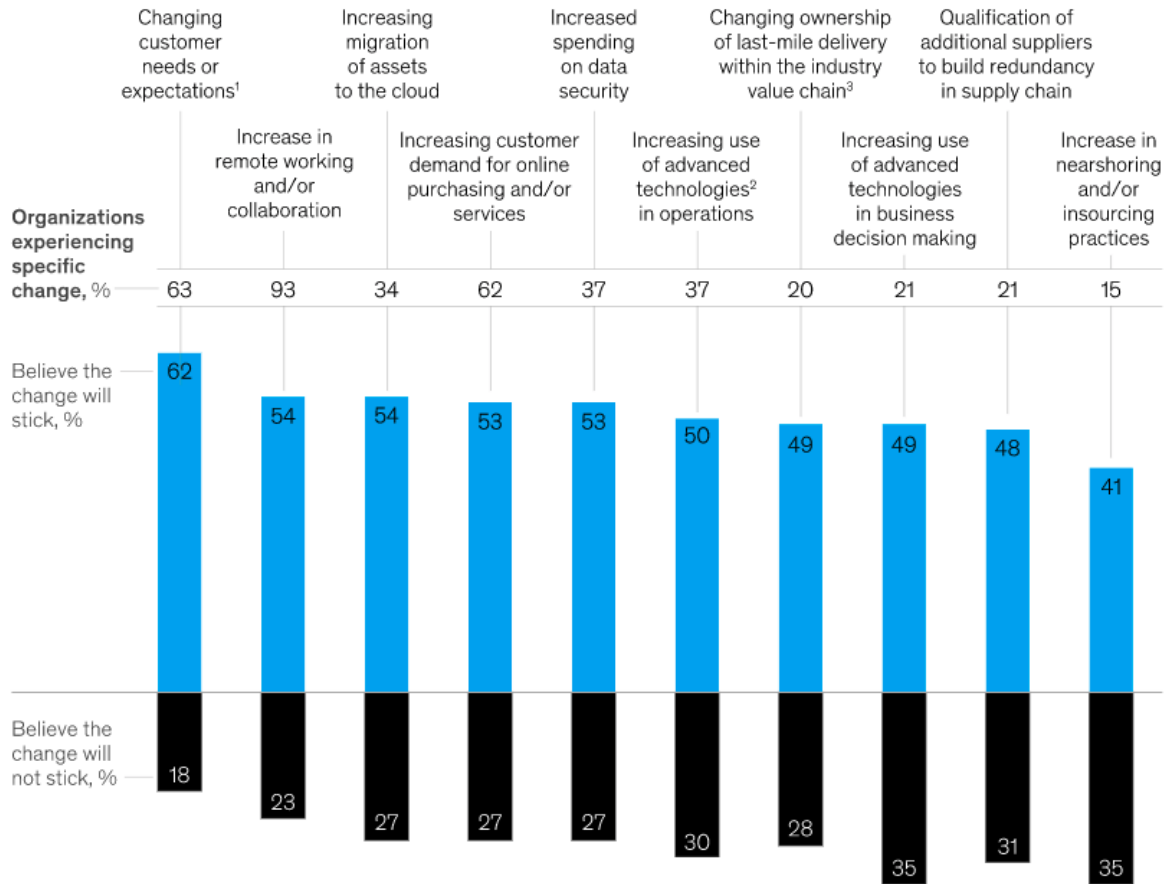
This change in how companies are allowing their employees to work is also changing how companies are hiring new employees. Companies are no longer expected to hire employees in their area or pay for relocation due to remote work becoming more normalized. This is vastly expanding both the hiring pool available to companies and the positions available to prospective employees. Josh Rack, one of my interviewees, anticipates that this shift in hiring practices will cause a redistribution in talent (Rack). Some of the bigger companies with a larger reach and better offers, will be able to hire whichever applicant that they would want, even if this applicant would never have agreed to relocate prior to being offered remote work. While the benefit is clear for larger companies, this is a double-edged sword for smaller companies who can benefit since they may operate in markets with a smaller talent pool and now have a larger group of prospective employees but will most likely lose out on more talented employees who qualify for jobs with better benefits and will work remotely. Ultimately, this shift in hiring practice will be a net benefit for employees as it will broaden job searches and create new opportunities.

One of the goals I had entering college and have set for the rest of my life is to be able to fully experience new cultures via travelling, then immersing myself within those cultures. Originally, I envisioned completing this goal by trying to find jobs that operated outside of my cultural circle, such as outside of the Midwest or, ideally, outside of the country. While achieving my goal in this manner is still possible, the option and newfound ease of remote work has created another avenue for achieving this goal. It is now more likely to find a position that gives me the

option to work from wherever I please, giving me the freedom to bounce around and work in many different areas while gaining cultural experience along the way. The COVID-19 pandemic changing the ways that work is done and expanding the opportunities that are available did not inherently change my goal of gaining cultural experience through work but created new avenues to achieving my goal.

### **Technological Shift**

Since the turn of the century, society has been digitalizing in almost every aspect of our lives. The COVID-19 pandemic spurred the acceleration of digitalization out of necessity, since stay-at-home orders and an onus to avoid face to face interaction obstructed our typical ways of operating. The sectors that will see the biggest of these shifts are in the industries that historically have struggled to modernize and were already behind, such as education, commerce, and finance. One of the interviewees, Doug Carlson, is a manager in Fifth Third's Commercial Digital department and said that business to business interactions were one of the most archaic and least modernized business facets within the company. When face to face business ceased last march, they struggled to adapt to digital marketplace trends and relationships with business partners struggled until they were able to deploy viable product lines to satisfy the new trends (Carlson, D.). The work to create the infrastructure and network for these changes heavily relied on software engineers and their work. This is believed to be a shared trend amongst most companies, but it has created opportunities for engineers to use newer technologies that the industry was adopting very hesitantly before the COVID-19 pandemic.



**Figure 2.** Longevity of Changes Adopted During COVID-19 Pandemic (LaBerge & Seiler, 2020)

Companies offering web services will most definitely start migrating their services to the cloud, allowing their products to scale, automate, and become more resilient (Balasubramanian, 2020). Companies have been using the cloud for decades, but adoption has been slow as some companies don't want to shift from physical on-site servers that they have used in the past. Utilizing the cloud allows a product to scale at the needs of its users and allows developers to tackle complex problems creating and optimizing software for distributed architectures. This new modernized consumer landscape is also creating a need for more automation in consumer products (Olalde & Sperry, 2020). Allowing the consumer to automate certain parts of their everyday activities makes their lives simpler, but it takes the careful decomposition of complex problems



by software engineers to make this possible. This decomposition presents an immense challenge requiring complex problem solving and use of a wide range of emerging technologies to solve these problems that didn't exist a year ago. It is rather that companies actually adopt these changes, as according to Figure 2 these are all changes that are among the top changes that are expected to remain post pandemic (LaBerge & Seiler, 2020).

Another goal of mine was to consistently work with new technologies that challenge me to learn more. These changes in terms of how software engineers will operate will foster jobs that allow for more creative freedoms due to the difficulty of certain problems. This freedom will allow me to constantly challenge myself with new ideas, as solving problems in the most optimal way always ends in a new adventure and the shift in business practices when dealing with technologies that are not yet an industry standard, will create plenty of opportunities for myself and other developers to explore. This exploration will foster personal growth, satisfying my goal, and create a greater wealth of knowledge in the software engineering discipline as a whole.

### **Personal Growth**

When entering a new industry fresh out of college, it is often hard to establish yourself but starting as a remote employee only makes this more challenging. When all employees were geographically centered, they would often get lunch together or spend time together outside of work. Sean Kane, my final interviewee, was a new hire starting last summer and has yet to meet his coworkers in person. He claims that one of the biggest things that he has struggled with was this lack of connection that he has with his coworkers (Kane). I have always struggled to network in more formal settings, and I believe not being able to have 'water cooler' type chats with my coworkers will add another hurdle to this struggle as well. To overcome this, I will have to take

greater initiative to foster relationships with my coworkers, whether it be through reaching out to set up times to talk or making an effort to work with different coworkers as often as possible.

I also hope to establish myself as a leader amongst my coworkers and throughout the company. Previously, in a traditional work setting, I saw the best path to achieving this goal to be an involved coworker who was quick to offer guided support, kept a strong ethical code, and, most importantly, had strong relationships with their coworkers. Sean Kane also has an interesting tactic in becoming a leader as he believes that to become a leader in this remote landscape, he plans to become an expert in a specific topic to field questions on and foster relationships amongst his peers (Kane). While I think that some of the new ways of working put in place have made certain aspects of this more challenging to obtain, I think that I can certainly put myself in a position to grow as a leader.

### **Conclusion**

As we move throughout the remainder of the pandemic and onward after it, we will continue to feel the changes that it has caused to all aspects of our lives. Business practices will continue to evolve, changing how the business landscape operates entirely and affecting the ways in which I am able to achieve my goals; however, I still anticipate that I will be able to overcome this new adversity and change of plans, still achieving my goals for my career.

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