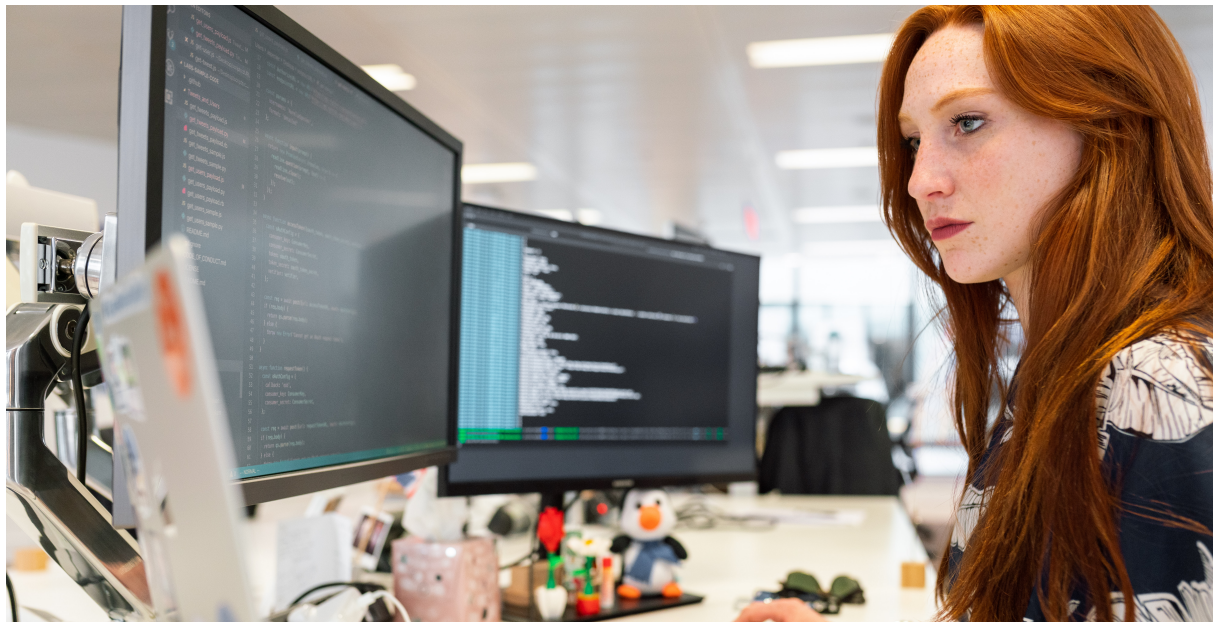


Full Report

Study to understand the impact of COVID-19 on Software Engineers



Developers have played an important role in society during the COVID-19 pandemic. During lockdowns, we've turned to technology to keep us connected and entertained. To fight the malignant disease, Contact Tracing apps and vaccine booking systems have emerged.

Nevertheless; little is understood about the wellbeing of Software Engineers during the pandemic or how technology teams have evolved. This study represents the first attempt to do so. From burnout to productivity, we sought to understand the state of software engineering in 2021.

The fieldwork of this study was carried out at remarkable speed, from the 23rd to 24th of June 2021. To achieve this feat, we partnered with research agency Survation.

Survation have a formidable record when it comes to opinion polling. Unlike other pollsters, they correctly predicted surprise results in the 2015 and 2017 UK General Elections. They also correctly predicted the outcomes of the 2014 Scottish Independence Referendum and the 2016 referendum on the United Kingdom's membership of the European Union.

Survation is both a Market Research Society Company Partner and member of the British Polling Council.

To reduce self-selection bias, invitations to complete surveys were sent out to members of Survation's panel and the surveys were then conducted by online interview. This approach is far more rigorous than say, running a poll on a website in which anyone can choose to take part.

In questions where the responses are a list of statements, these would be randomised. The only questions where the answer statements would not be randomised would be those where there is a natural order to maintain (e.g. a scale from "to a great extent" to "not at all").

The population sampled included Software Engineers aged 18+ living in the United Kingdom. In total we surveyed 258 such people. In future we would like to conduct larger studies over multiple countries.

Interestingly, we identified that only 26% of Software Engineers find themselves solely working on product development. 74% find themselves working on operations in some form, even if only as part of their job. Indeed, 44% of Software Engineers found themselves in hybrid roles.

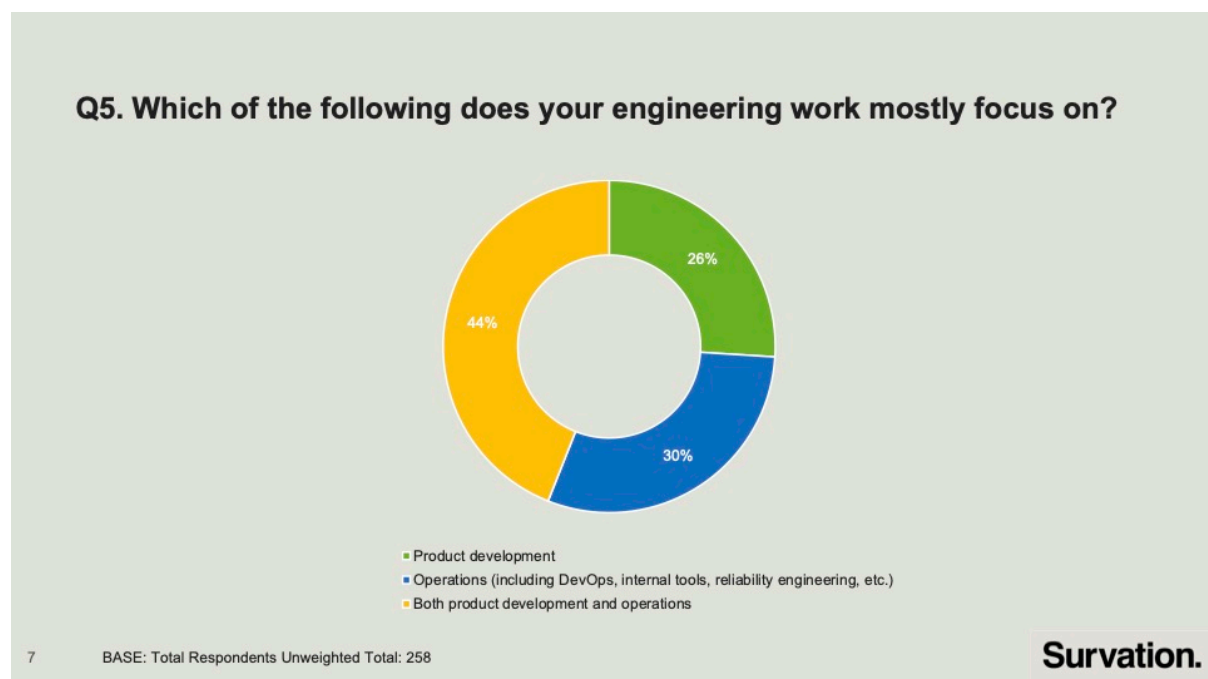


Figure 1: Only 26% of Software Engineers find themselves solely working on product development. 74% find themselves working on operations in some form, even if only as part of their job.

Burnout

We began by asking Software Engineers about their experiences of burnout. The results were worse than we anticipated.

A total of 83% of Software Engineers reported feelings of burnout with only 17% reporting no burnout. 55%, a majority, reported “great” or “moderate” levels of burnout.

We then asked if the pandemic had made things worse for people. **81% reported personally feeling more burnt out of work due to the COVID-19 pandemic.** 32% said this was true to a “great” extent and 30% to a “moderate” extent.

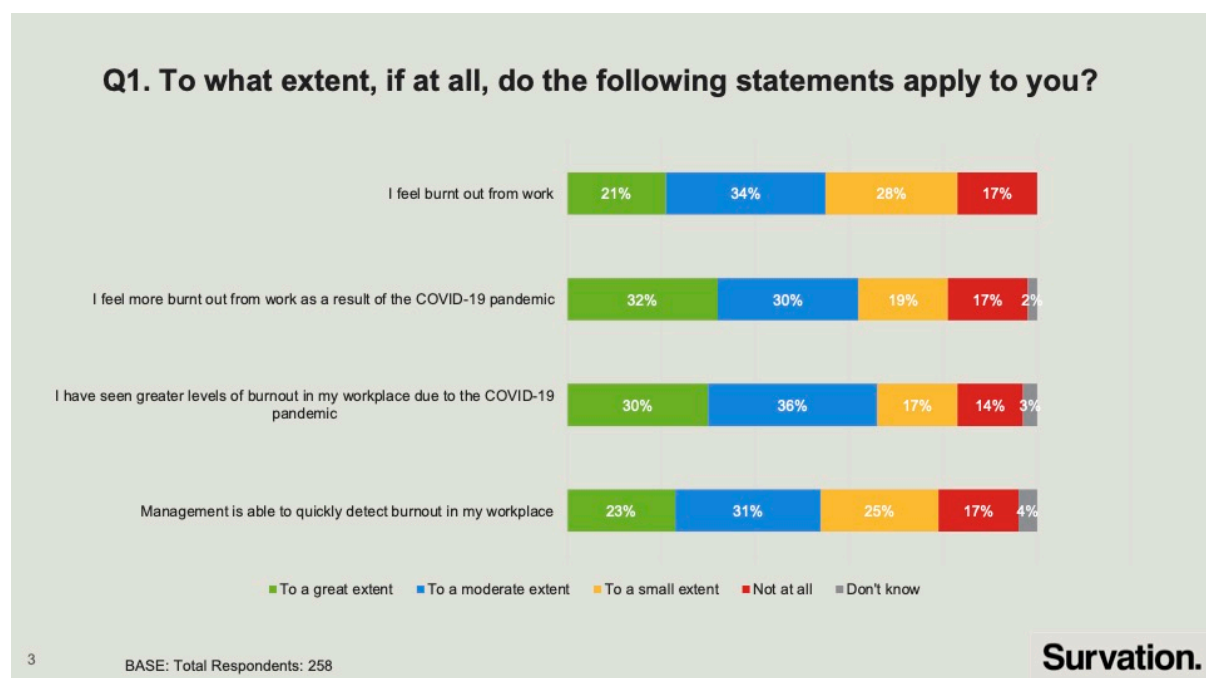


Figure 2: 83% of developers suffer burnout with 81% reporting increased levels of burnout during the pandemic.

The top reason reported for pandemic related burnout was increased workload, with 40% of Software Engineers reporting burnout providing this as a reason. This ranked above any personal reasons for experiencing burnout.

When we asked about burnout in general, high workload (47%) again came top. Other top work-related reasons for burnout included inefficient process (31%) alongside unclear goals and targets (29%).

This shows us that high workload is the leading cause of burnout amongst Software Engineers and that it has been made worse than any other factor during the pandemic.

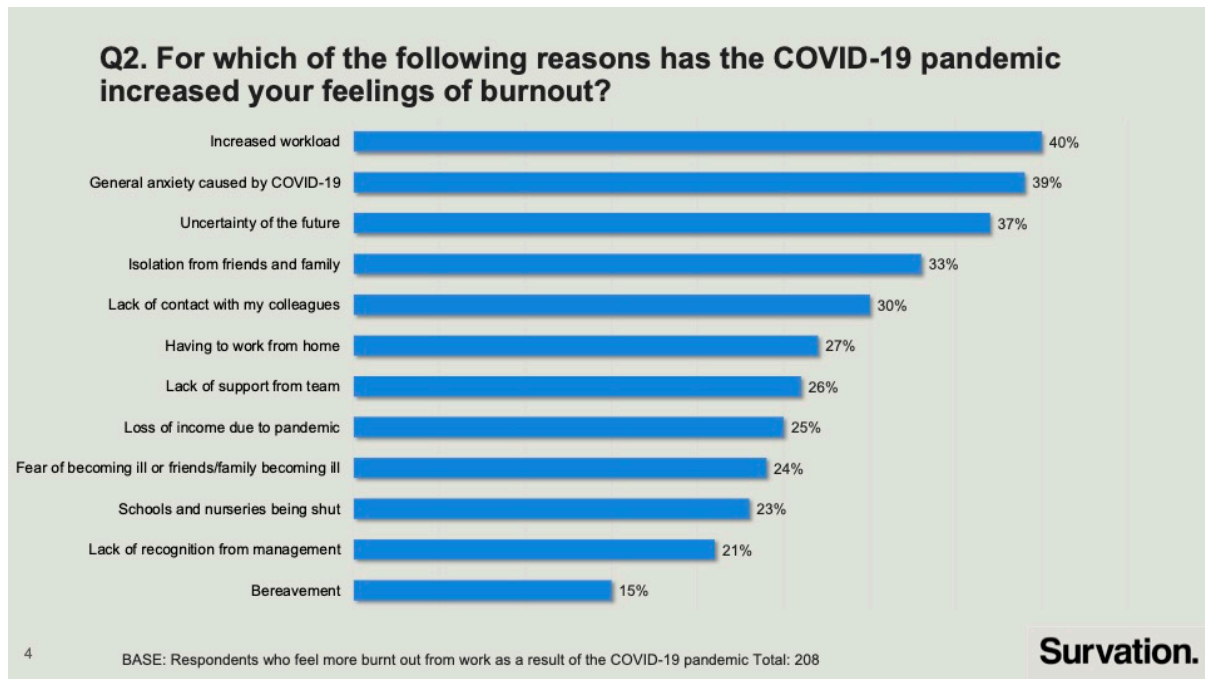


Figure 3: The leading reason for pandemic-related burnout was “increased workload”.

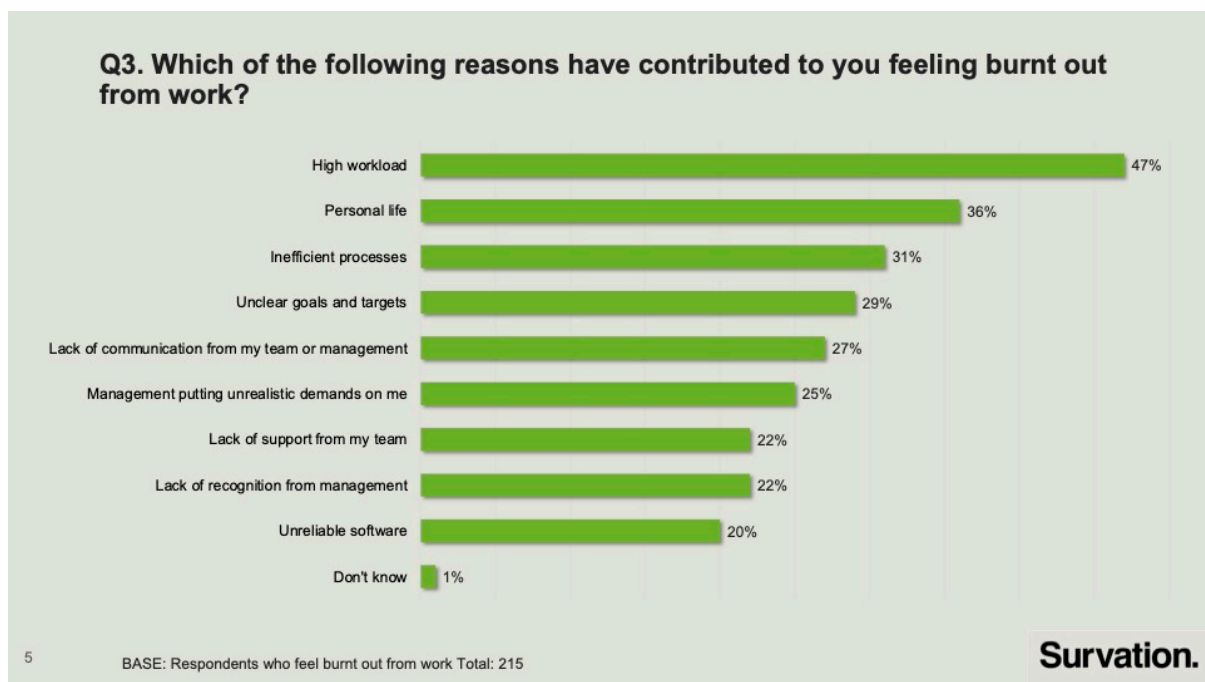


Figure 4: The top reasons cited for all-cause burnout included high workload (47%), inefficient process (31%) alongside unclear goals and targets (29%).

Reliability & Process

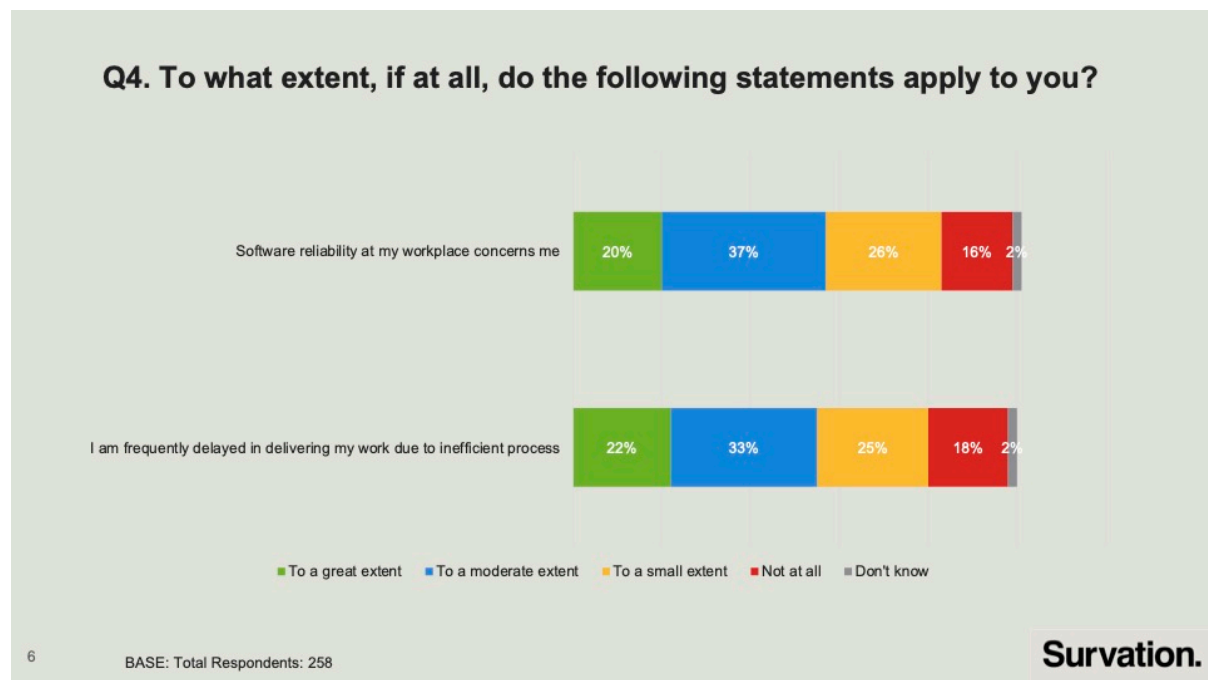


Figure 5: The top reasons cited for burnout included high workload (47%), inefficient process (31%) alongside unclear goals and targets (29%).

We went on to study Software Engineers' feelings about software reliability and process.

In total, 83% of Software Engineers were concerned about software reliability at their workplace, with 20% being concerned to a great extent. Incidentally, in the previous question, 20% of engineers experiencing burnout attributed "unreliable software" as a cause.

55% of engineers reported that they were frequently delayed in delivering work due to inefficient process to a "great" or "moderate" extent. Again, in the previous question, 31% of engineers experiencing burnout attributed "inefficient process" as a cause.

Cycle Time

At Haystack, we use Cycle Time as a key north star measure to understanding the productivity of an engineering team. Cycle Time measures how quickly an engineering team can deploy ideas into production to get feedback from real-world users. Shorter Cycle Times also indicate that teams are better at subdividing and prioritising work whilst obtaining the reliability benefits of shipping smaller changes at any one time. It measures the end to end flow of a Software Development Life Cycle, all while minimising Work In Progress.

We asked software developers what their typical Cycle Times looked like - specifically "Thinking about your workplace, on average, how long does it take for you to begin working on a feature and reliably deploy it into production?"

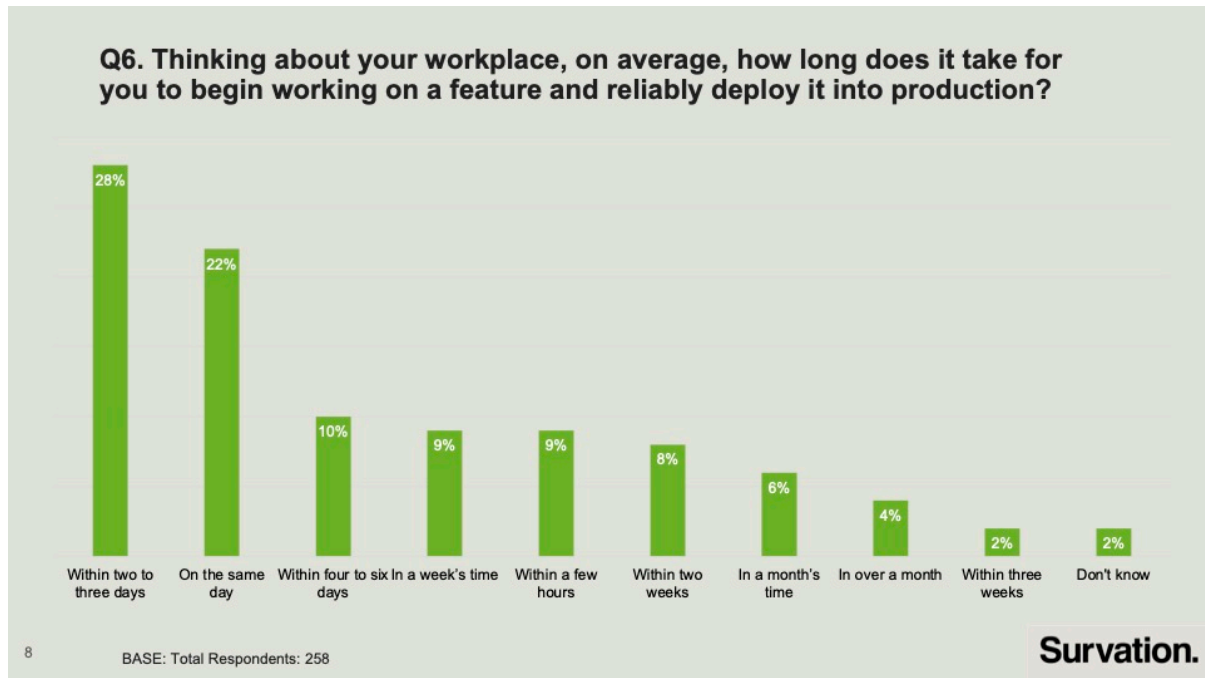


Figure 6: 50% of Software Engineers report Cycle Times of 1-3 days at their workplaces. In only 4% of cases do Cycle Times exceed a month.

Cycle Time	% Responses	Cumulative %
Within a few hours	9%	9%
On the same day	22%	31%
Within two to three days	28%	59%
Within four to six days	10%	69%
In a week's time	9%	78%
Within two weeks	8%	86%
Within three weeks	2%	88%
In a month's time	6%	94%
In over a month	4%	98%
Don't know	2%	100%

Table 1: 59% of Software Engineers report Cycle Times of less than 3 days at their workplaces.

Previously, Google's DORA team have asked respondents about Change Lead Times in their State of DevOps reports - this has a slightly different definition centred around deployment speed ("how long does it take to go from code committed to code successfully running in production"). The DORA team then use this Change Lead Time as one of their four key metrics to divide the universe of technology teams into low, medium, high and elite performers.

We grouped our respondents into low, medium, high and elite performers based on applying the same performance criteria that DORA use for Change Lead Time.

Despite Cycle Time being a more broad metric than Change Lead Time, we found the elite and high performer groups were larger in our study. The medium and lower performer groups were both substantially smaller.

	DORA 2018	DORA 2019	Haystack/Survation
Elite Performer	7%	20%	31%
High Performer	48%	23%	47%
Medium Performer	37%	44%	16%
Low Performer	15%	12%	4%
Don't Know	-	-	2%

Table 2: Performance profiles from DORA State of DevOps reports are calculated on the basis of four dimensions. Haystack/Survation performance profiles are based purely on Cycle Time metrics.

These results show that software teams are increasingly competitive at being flow-aligned and shipping value to customers. Elite and high performing teams have become the new normal and represent a supermajority of teams.

At Haystack, we've found that effective teams deliver better business outcomes whilst preventing developer burnout by focusing on optimising for flow instead of the volume of work delivered.

You can read more on the importance of Cycle Time in our blog posts: [*"Ship Software Smaller, Deliver Better Product"*](#) and [*"The Accelerate Book, The Four Key DevOps Metrics & Why They Matter"*](#).

Reaction

After collecting these results; I was lucky enough to be able to catch-up with **Kathryn Koehler, Director of Developer Productivity at Netflix**, and give her advance sight of this study.

Whilst Kathryn said we had a “good set of questions” in this study, she also reemphasised to me that the results showed “you can’t capture the productivity of a team in one metric.”

Indeed, the novelty of measuring developer burnout in this study has shown that well-being has often been disregarded when measuring engineering productivity.

Kathryn’s work at Netflix is currently focussed on measuring bootstrap times for development time, her team will focus on this single metric to start with. Kathryn plans to focus on optimising for this metric by “starting small, but starting on something that is impactful; and then not stopping there - continuing to think about productivity, satisfaction and the other stuff in context.”

I am grateful to her for providing feedback on this study.

Conclusion

Through using state-of-the-art research methods developed by researchers, we have been able to rapidly collect data on the experiences of Software Engineers during the COVID-19 pandemic, whilst minimising potential bias in respondents.

The results of this study provide us an insight into Software Engineers experiences of burnout, reliability and development process.

We have found that 83% of software developers suffer from workplace burnout. The top reasons cited for burnout included high workload (47%), inefficient process (31%) alongside unclear goals and targets (29%). 81% of Software Engineers reported an increase in burnout as a result of the pandemic, with increased workload cited as the main reason.

Our study also finds that 83% of developers are concerned about software reliability at their workplace, of which 20% are concerned to a great extent.

We conclude by finding that technology teams are becoming increasingly flow-oriented, focusing on cutting Cycle Time for delivering business value into production. A majority of Software Engineers, 59%, report Cycle Times of less than 3 days at their workplaces.

***Junade Ali CEng
12th July 2021
Edinburgh, Scotland, UK***

Appendices

- Study to understand the impact of COVID-19 on Software Engineers - Summary Report
- Study to understand the impact of COVID-19 on Software Engineers - Final Tables