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Heather Miller, Institute for Software Research, CMU
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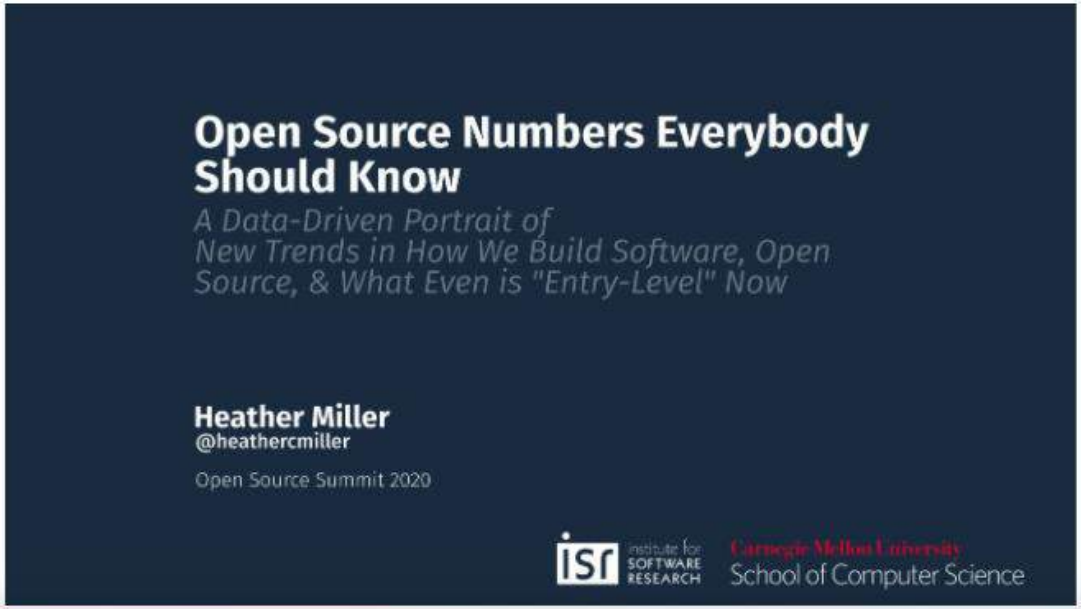

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classes of drivers. It's not just simple things. A touchscreen is a fairly simple driver in the end. But we are also starting to see all the drivers for AI and completely new things that basically did not exist ten years ago, just because people's expectations of what a computer does have changed. In that sense it affects me as a kernel developer, but it does not affect me another capacities.

>> Usually we close our conversations joking about our next dive trip, I think our next dive trip is going to be in Washington state in really cold water. I may or may not see you there. I may or may not see you there, but thank you so much. I enjoy chatting with you as always, and back to Jim.

>> Thank you, Dirk, and Linus. Our next speaker is Heather Miller. And she founded the center and 2016. Today she is going to share a data-driven portrait of the open source and how we build software. I'm very excited to welcome Heather Miller.

♫ ♫

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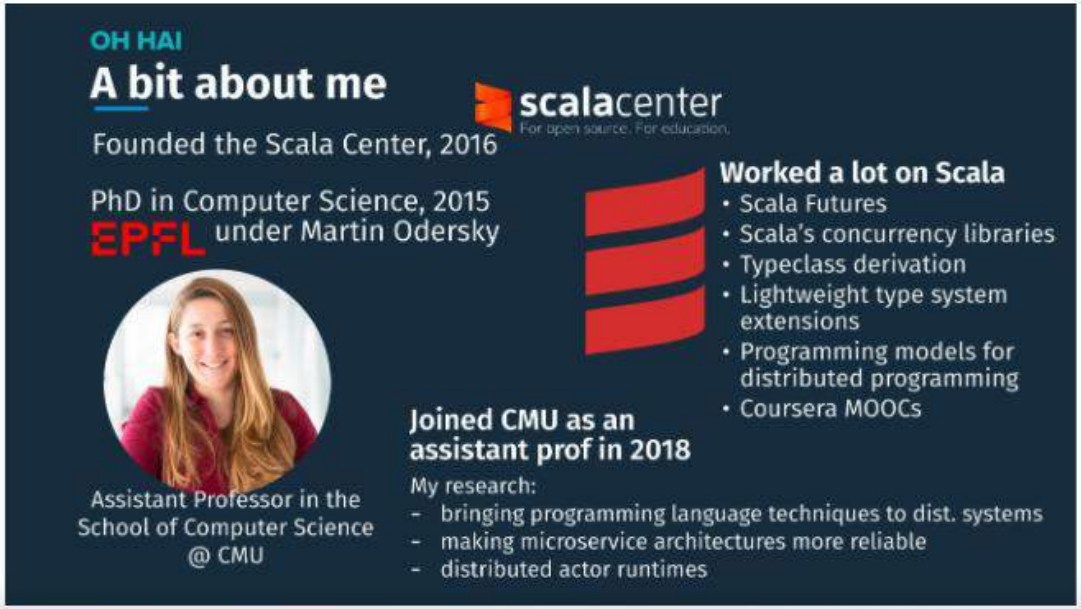

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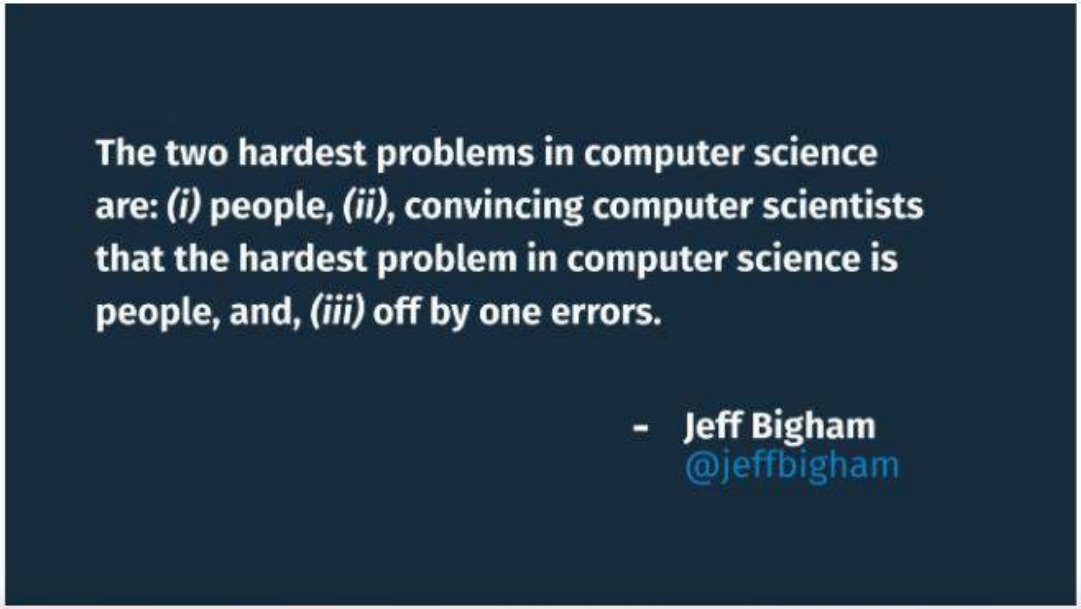

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SCALA CENTER

I'm the founding director.

And suddenly my focus is 200% what is happening in open source Scala, and how we can keep growing our ecosystem, tools, and improve developer experience for anyone.

Not only people paying into the Scala Center. But anyone with an internet connection. A good developer experience should be free.

This shift in focus was eye-opening.

I quickly observed problems with the health of some of our core projects in our own ecosystem that was cause for concern.

And what's worse, this trend is common throughout the open source community.

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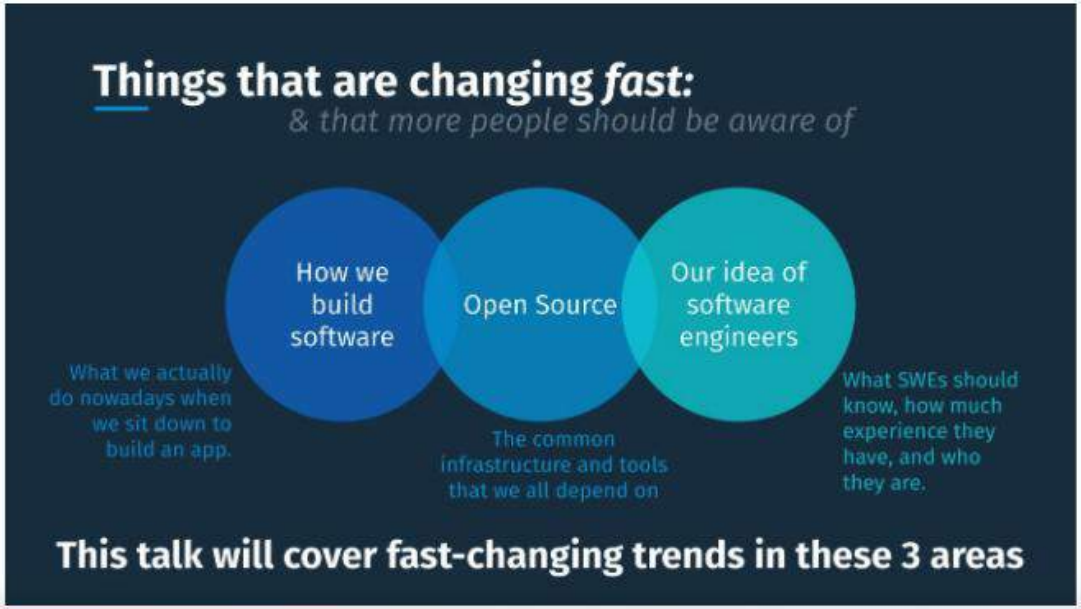

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problems in computer science are people, I agree with that spirit to come a convincing computer scientist at the hardest problem and computer science is people, and three, off by one errors. I still think this is true. And since becoming the director of this thing called the Scala Center, I went from doing stuff, distributed programming, and dealing with code and things like that, to focusing 200% on what is happening in the open source community. I been a part of it for several years holding my PhD, but it was never my responsibility to make things better until after I finished and they said, were going to do this. Our goal was not just to benefit people who are paying into the center, but it was anybody who had Internet connection. They should have a good Internet experience. When I had to go through this shift, I quickly absorbed a lot of problems in the Scala community and then I notice some of these things are problems for other communities as well. And the numbers that I am collecting are not Scala specific, there are generally open source specific, and when it comes to educational statistics, focusing on the U.S. mostly because that's where I am. That's where a lot of the large developer community is within the U.S. Some of these trends hold true, especially in Western Europe. I started collecting data on some of these fast changing trends and things that I want to bring to your attention. We will touch on three

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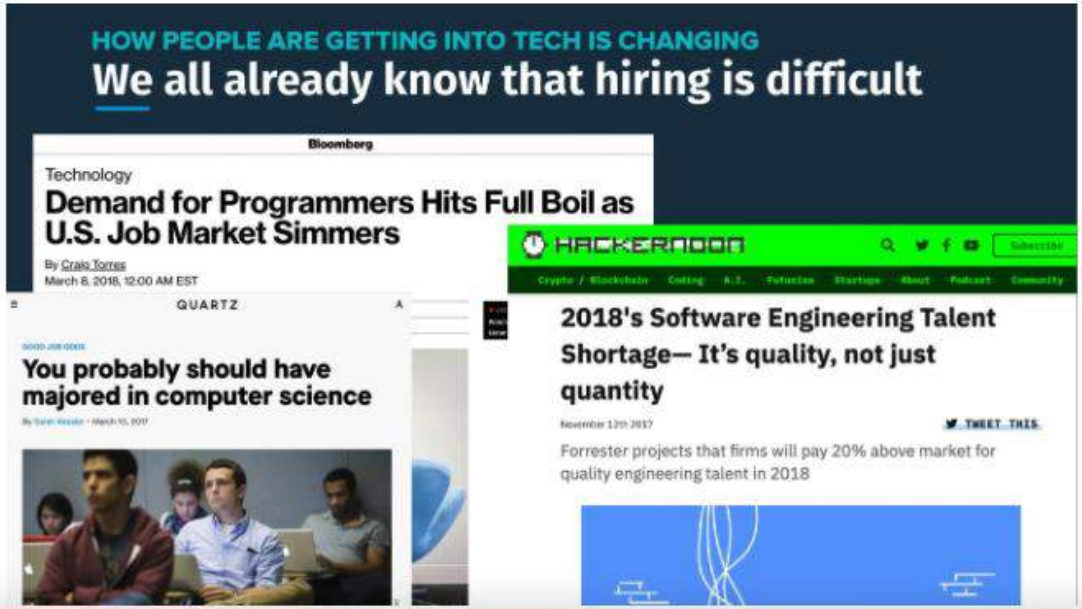

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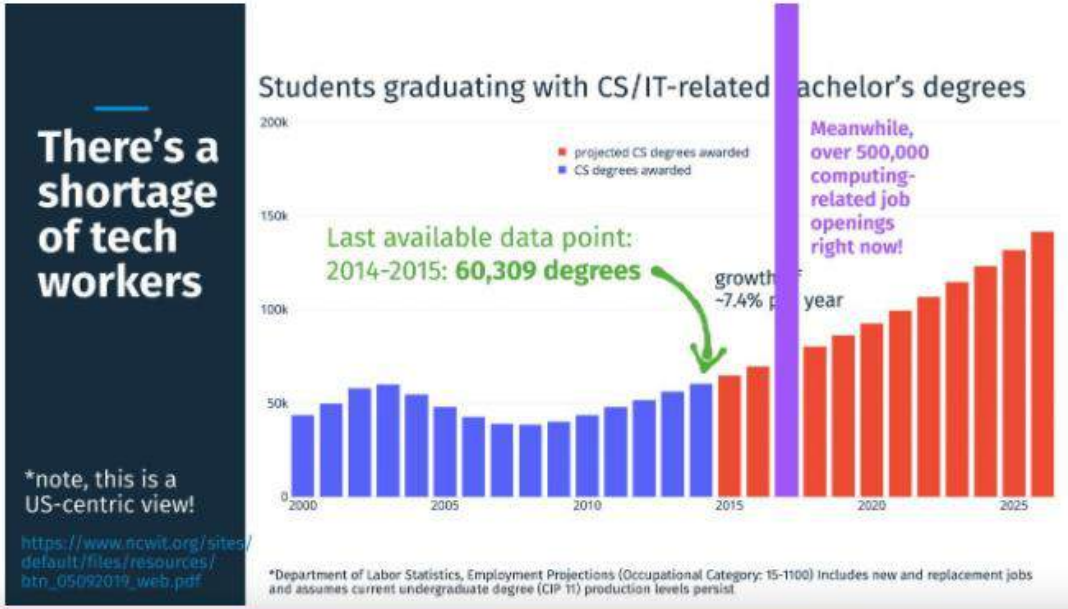

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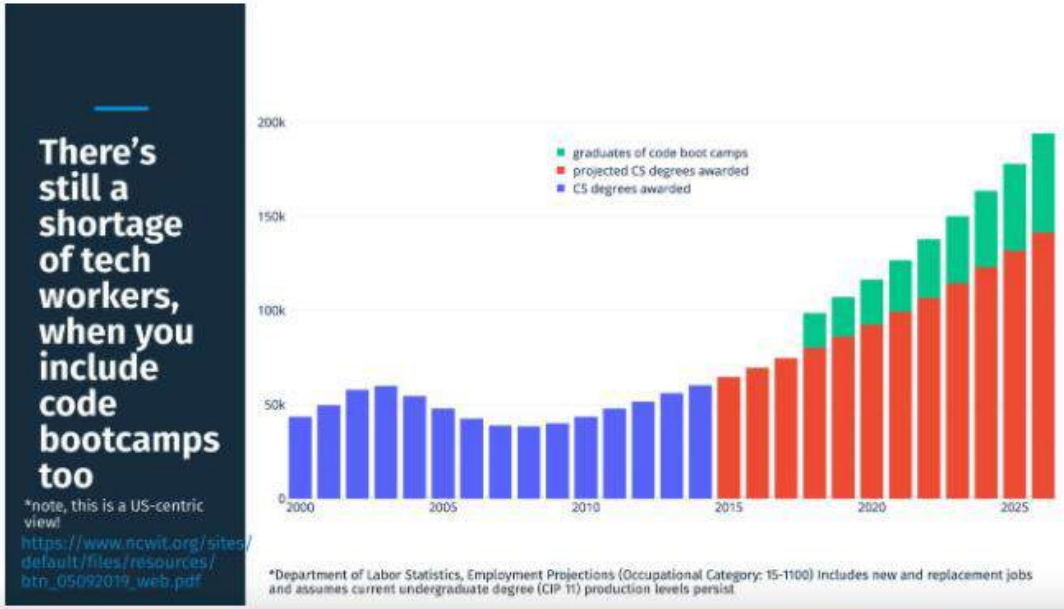

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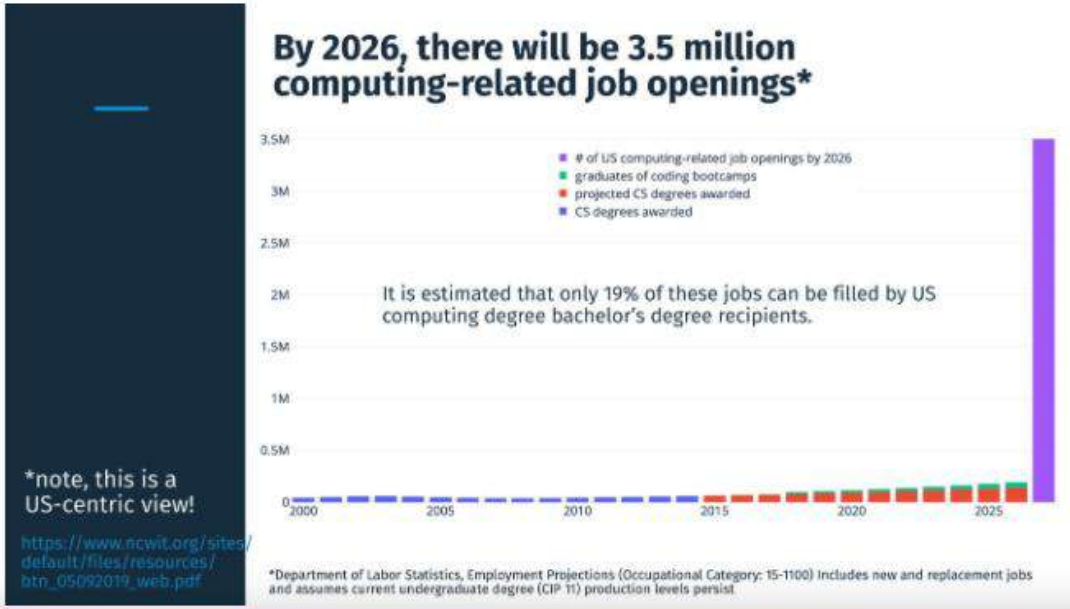

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TAKEAWAY:
We need to adapt, culturally, to make room for lots more newcomers

The demand for developers is just going to get more and more ridiculous.

The years of experience of practicing SWEs is dropping overall.

There's a tidal wave of newcomers entering our profession, and it's not going to slow down.

It's going to pick up speed.

What do we do?

"New frameworks are lowering the barrier to entry," Caleb Fristoe (founder of CodeTN) says; that's a far cry from the days when you had to learn the syntax of several programming languages to build useful software. "Rather than typing these seven lines of code to get a menu to pop down, you just download the framework from a code base that allows you to do that in a simpler way," he explains. "Frameworks are taking the hard work that developers prided themselves on out of the equation."

The New Jobs
By Marina Krakovsky
Communications of the ACM, January 2018, Vol. 61 No. 1, Pages 21-23
10.1145/3157077
https://cacm.acm.org/magazines/2018/1/223883-the-new-jobs/fulltext

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their professional software developers and they say how many years they been programming. And, there is just a large number of people concentrating towards the top. Which means people have less than one year of experience, or one or two years of experience. More people less than five. The point here is there is a lot of people coming in, and I'm 30 something, I'm a professor, but any sort of software engineering, I don't assume that there are people extremely different and with a lot less experience than me coming in at a rate that they are. I think this is something that more people need to consider. It's basically we have a lot of newcomers and their arriving quickly. And so my point is that there are a lot of new developers coming in, this tidal wave of new developers entering our profession is not going to slow down. It's just going to pick up speed. The overall years of experience, professional software engineers, that is going down because they are so many new people coming in. There are a lot of, you know, reasons obviously computer science has become a very cool profession and there are a lot of initiatives to promote people majoring in this and college. People would like to perhaps change career trajectories and get into computer science or programming. One thing that has enabled some of this growth as attributed to a founder of a boot camp and Tennessee, this comes from

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"With companies unable to fill open positions, current employees are expected to fill the gaps. In many cases this results in employee turnover. Over a third of respondents we surveyed (36%) said the lack of timely hiring has caused burnout in existing employees and affected their businesses."

Is the Tech Talent War Hurting Innovation? Hiring Managers and Tech Recruiters Respond
December 5, 2016
http://blog.indeed.com/2016/12/05/impact-of-tech-talent-shortage/

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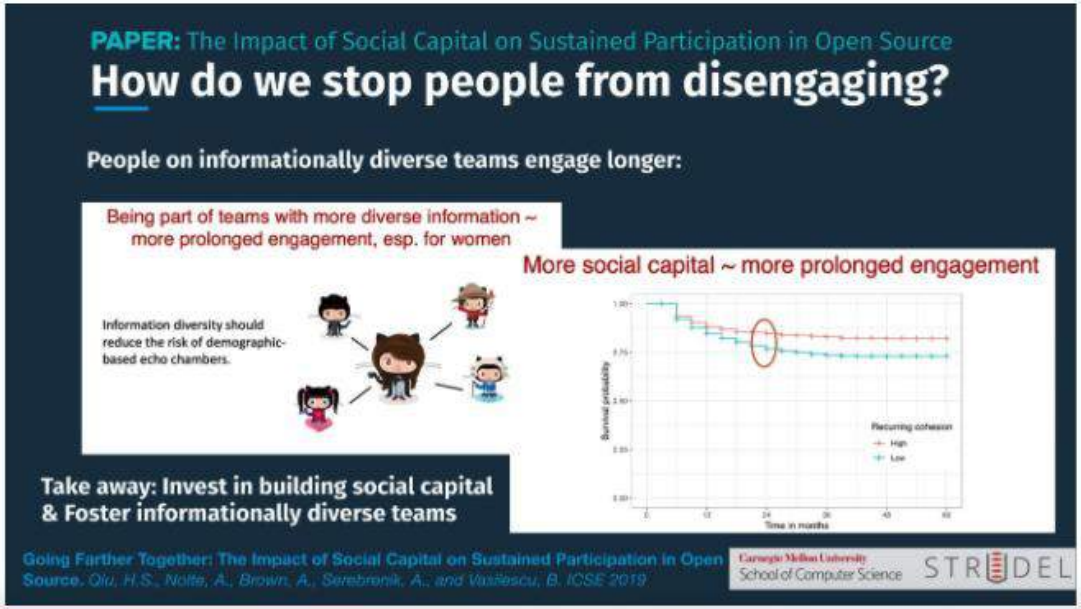

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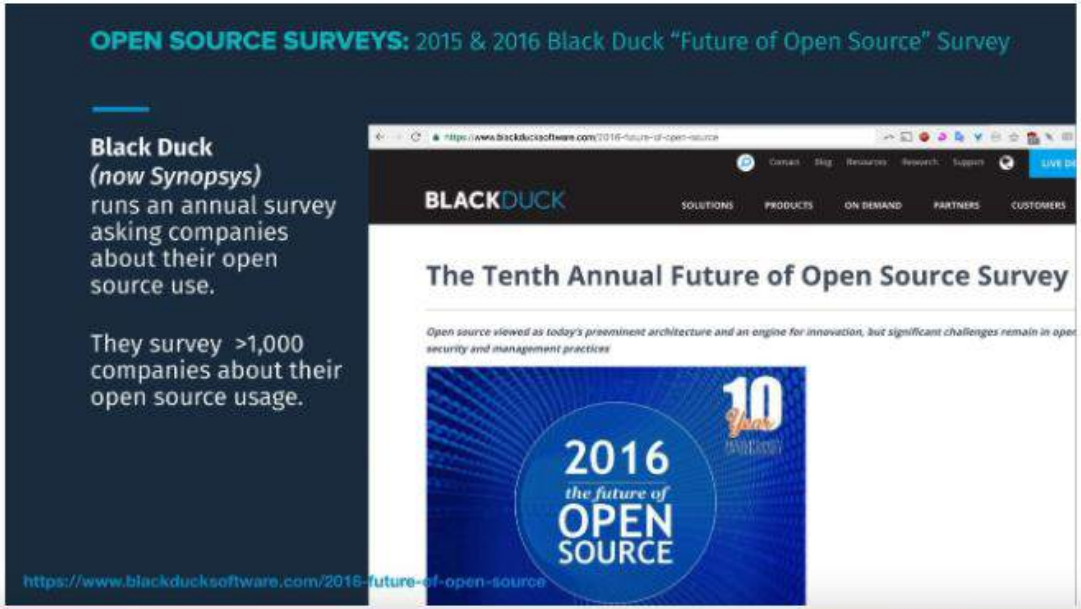

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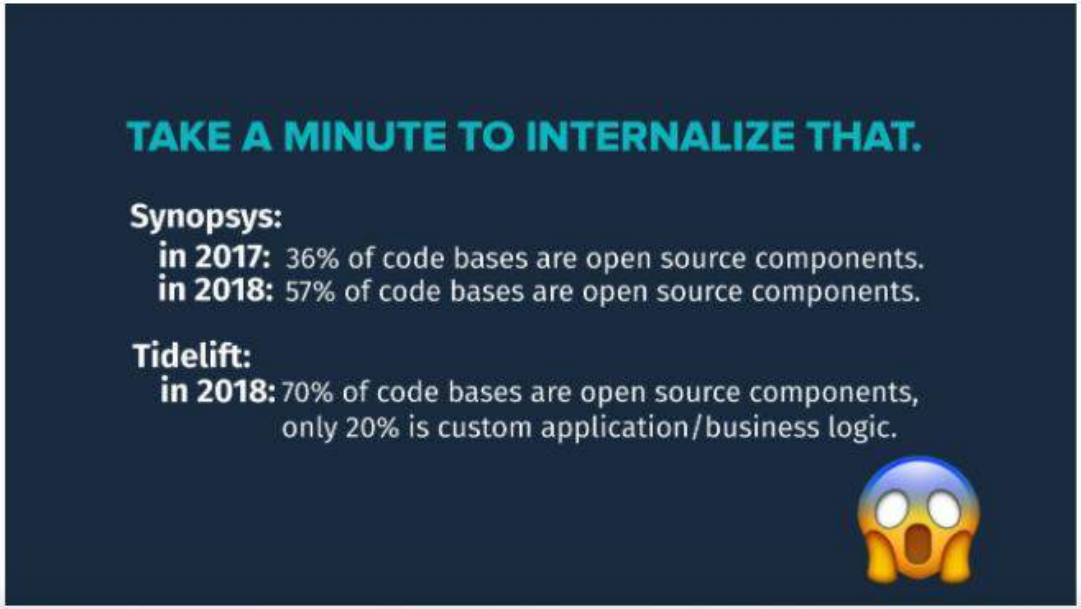

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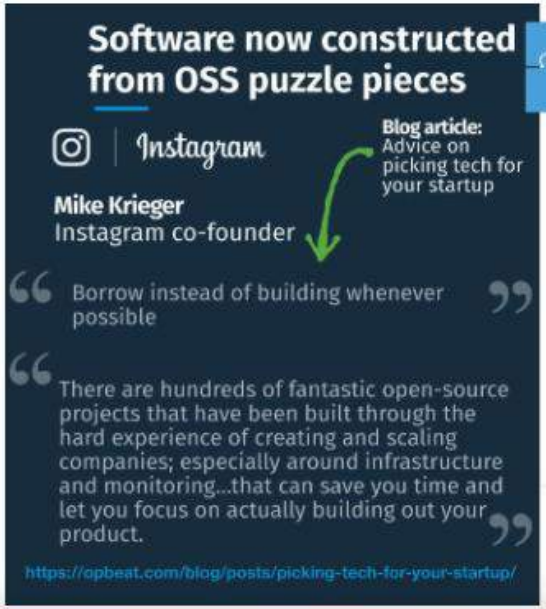

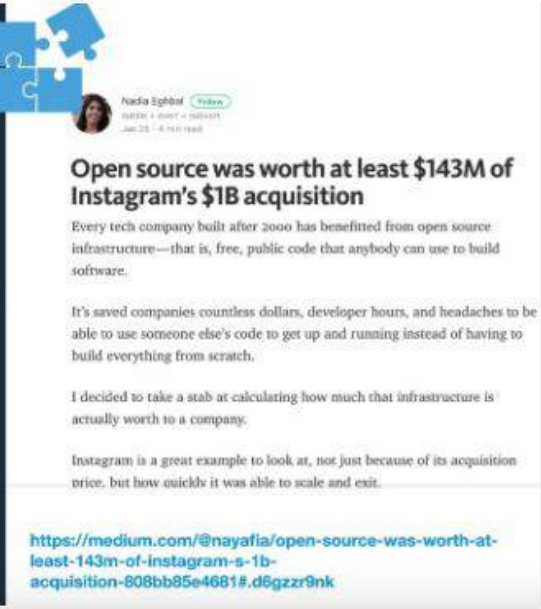

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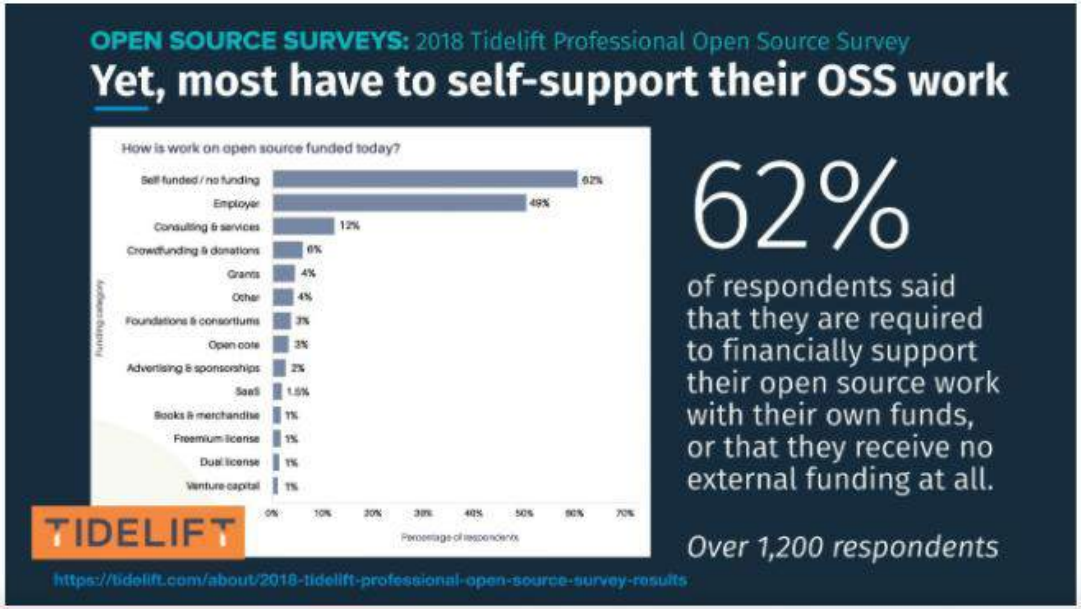

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"I had always assumed, (as had the rest of the world) that the OpenSSL team was large, active, and well resourced."
– Steve Marquess

In reality, OpenSSL wasn't even able to support one person's work.

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terrified that we might already know about. We know about things like heart bleed, two-thirds of the Internet using open SSL and nobody realizes that open SSL, it wasn't even able to support a single person's work even though two-thirds of the Internet was using it. Those are things that hopefully the foundation is here to fix. Then we have things like the truck factor, researchers try to measure things like the truck factor. It's the minimal number of developers that have to be hit by a truck or be otherwise disappear from a project. Linux is also, it has a super high truck factor but things are pretty used, closure, a lot of people use these things and they don't realize the truck factor is low. If I've learned anything from the Scala community, it's everything because we have had issues with community and the ecosystem. And just to throw another paper in here in case you are interested, this is some numbers about programming adoption. The thing I would like to point out here

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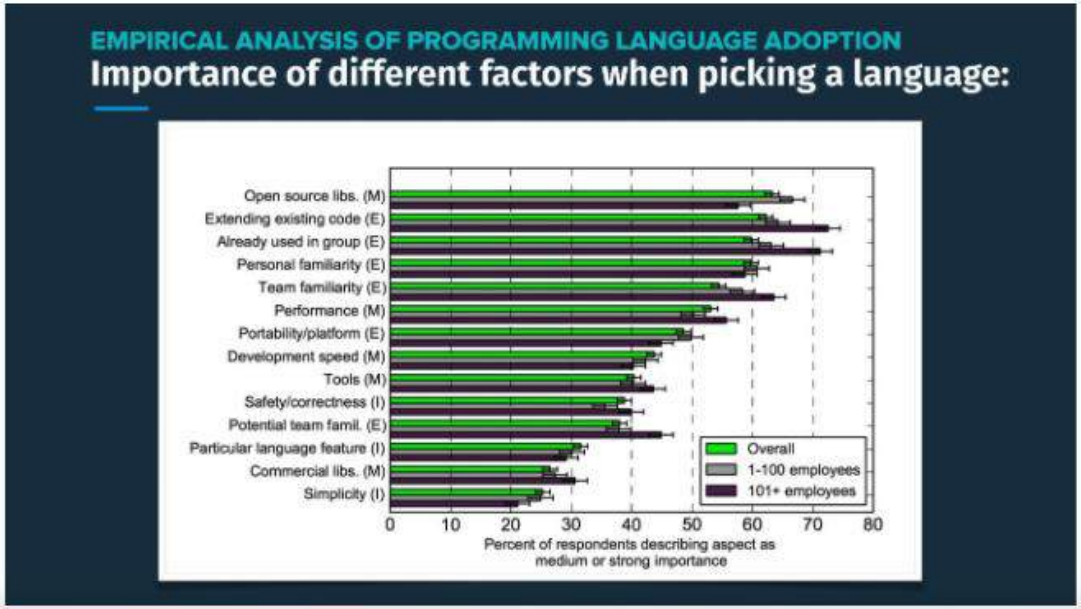

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on the weekends. There is not a company backing them. That's incredible. That's a huge number. I am going to mention a few things that are a little
terrified that we might already know about. We know about things like heart bleed, two-thirds of the Internet using open SSL and nobody realizes that open SSL, it wasn't even able to support a single person's work even though two-thirds of the Internet was using it. Those are things that hopefully the foundation is here to fix. Then we have things like the truck factor, researchers try to measure things like the truck factor. It's the minimal number of developers that have to be hit by a truck or be otherwise disappear from a project. Linux is also, it has a super high truck factor but things are pretty used, closure, a lot of people use these things and they don't realize the truck factor is low. If I've learned anything from the Scala community, it's everything because we have had issues with community and the ecosystem. And just to throw another paper in here in case you are interested, this is some numbers about programming adoption. The thing I would like to point out here is if you look at the top of the graph, basically these researchers stated a lot of surveys. They analyzed a lot of code and they were talking to developers, 13,000 developers. The

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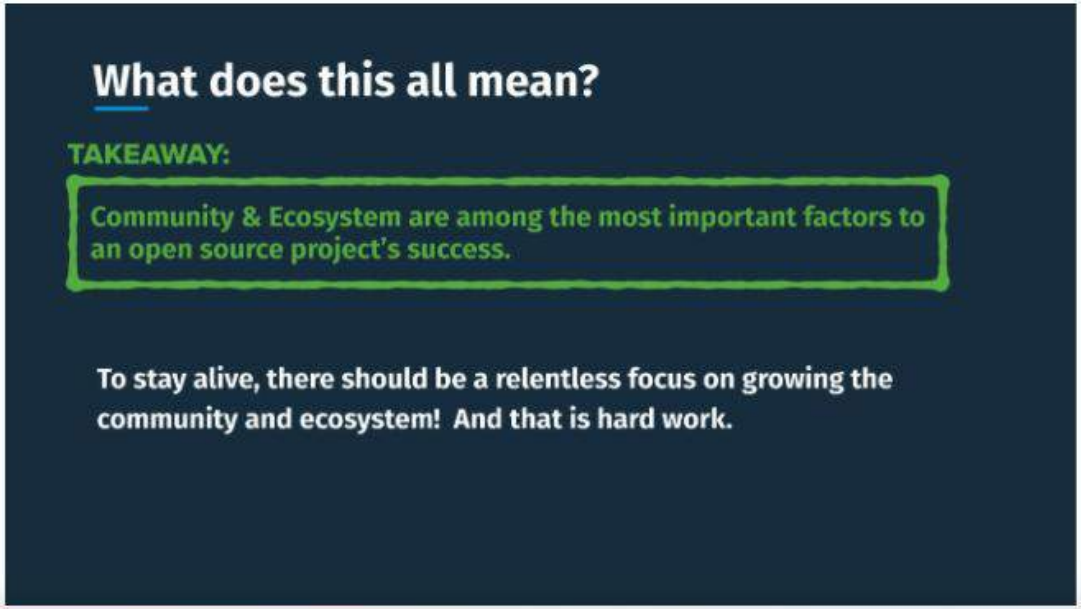

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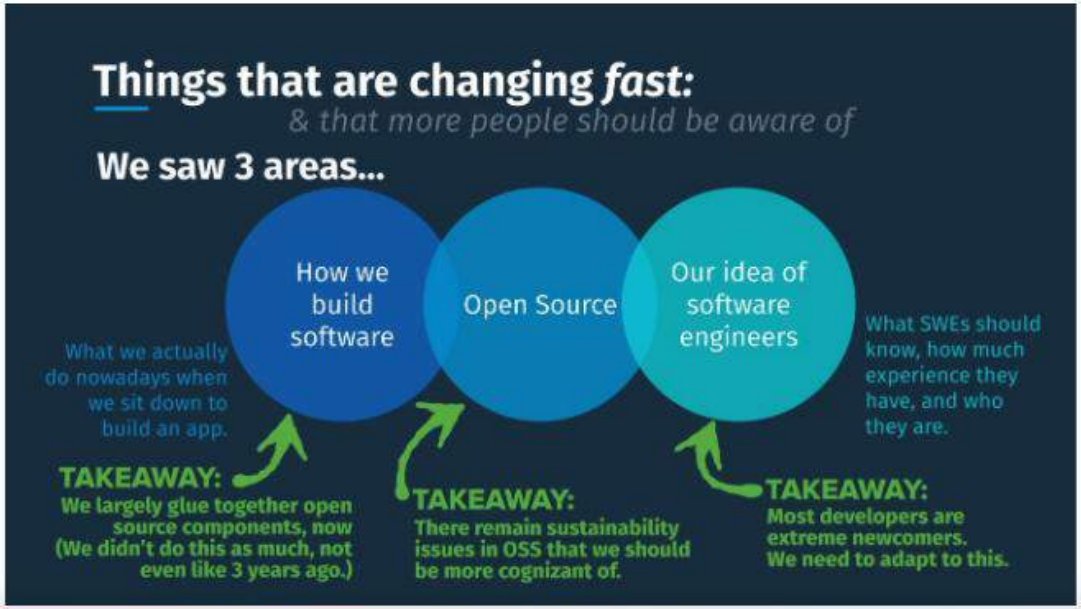

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