

A series of horizontal orange lines that start on the left, pass behind the text, and then branch out to the right, creating a sense of movement and connectivity.

# State of software development

\_2021

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# introduction

Welcome to the State of Software Development 2021 report!

We're proud to have been publishing this report annually since 2017. We've come a long way since then.

This year, we're delivering you insight from nearly 600 people in the software industry, as we've worked with 12 fantastic partners to promote the survey.

The level of openness and enthusiasm we experienced in our shared effort is exactly what we need to build things bigger than ourselves. To build things that matter.

Software development matters to us.

This is why we put in a tremendous amount of work to learn about its emerging trends.

We consider people in software development a worldwide community. We care about the community deeply, and this is why we share everything we've learned.

What's in the 2021 report?

We refined the questions, but they largely remained the same. The idea is to show trends and to present the changing landscape of software development in an easily readable way.

The report is divided into five main sections.

The first one focuses on management-related trends and challenges, followed by a technology and tool-focused chapter, then we move on to hiring, outsourcing, and finally performance management.

The data is filtered in different ways to show you the difference between the average and top-performing teams and between the challenges of developers and managers.

In some cases, we compare this year's data to previous results to show you how the trends have been emerging over the past years.

I hope you will enjoy scrolling through the report and find some exciting insight you can apply right away.

Thank you,

Matt Wohlmuth  
CEO, Coding Sans



# our top partners

Publishing this report wouldn't have been possible without the close collaboration of our partners. They had the highest impact on taking this report to the next level and truly deserve a highlighted spot in this report.



The legendary GitKraken Git Client is designed to increase productivity by making Git commands processes fast and intuitive. Benefits include repo management, in-app code editing and merge conflict resolution. [GitKraken Pro comes with a 7-day free trial.](#)



The leading ratings and reviews platform for IT, marketing, and business service providers used by over half a million buyers and sellers of services. Clutch has been recognized by Inc. Magazine as one of the 500 fastest growing companies in the U.S. and has been listed as a top 50 startup by LinkedIn. [Check them out at Clutch.co!](#)



Cooperpress is the publisher for several weekly email newsletters reaching an audience of over 350,000 developers and software engineers. Never miss the important info about your favorite technology. [Click here to subscribe for free!](#)

# partners

Our partner companies did their fair part in promoting the survey and together, they made a serious impact on raising the participation level.

 storyblok

 dashbird

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 Serverless Guru

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Coder

 MEETUPFEED

 webiny

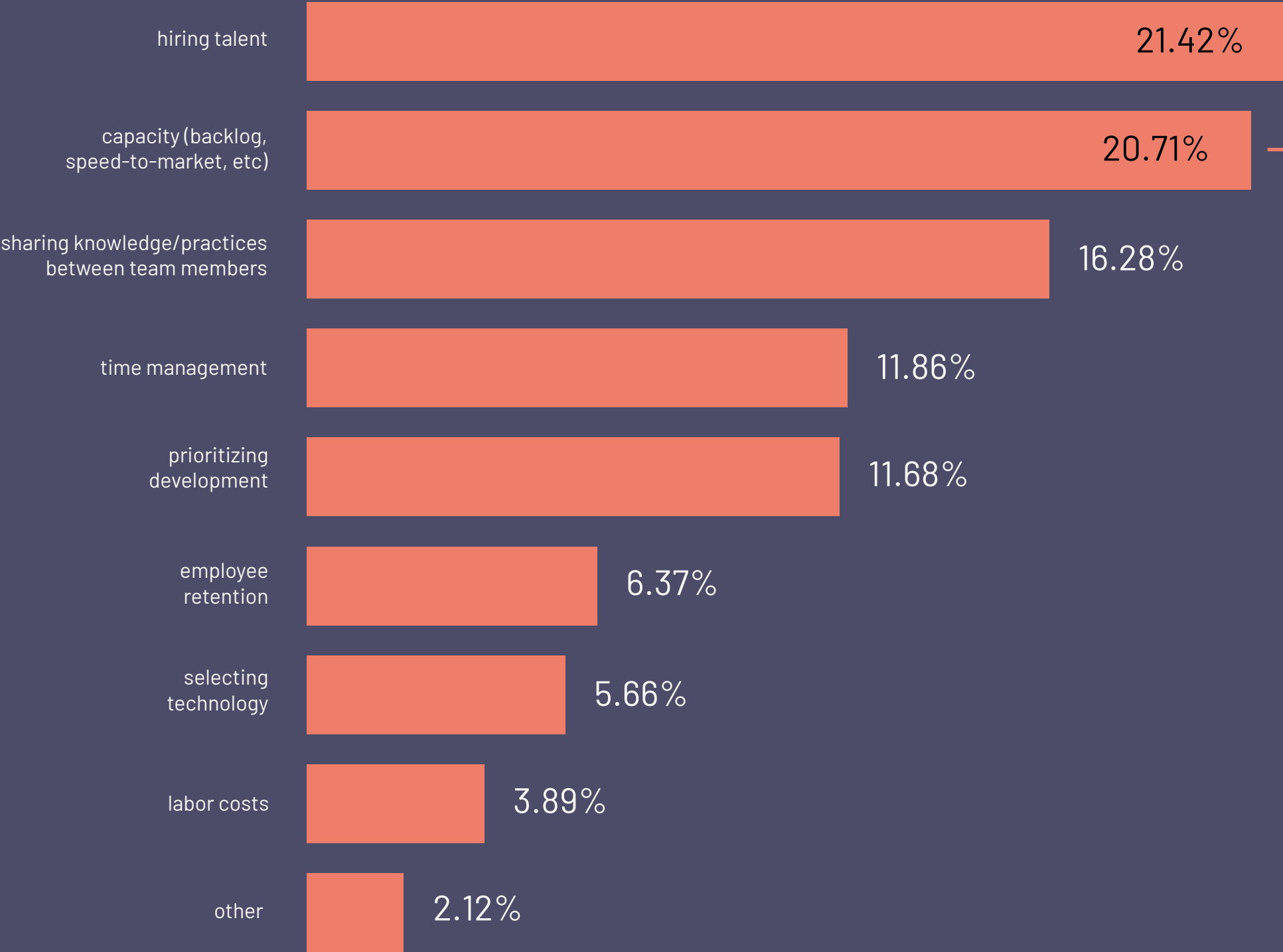
# managing software development

The biggest challenge tech companies are facing in 2021 is hiring talent. Some companies may have been forced to downsize, but it's great to see many are in a position to keep hiring.

The second biggest challenge is capacity. This explains hiring being on top and points out a need to keep learning and perfecting processes. Reports like this provide a chance to learn from each other.

What makes this section more interesting is the separation of developers and developer managers since the nature of the two job categories are different, making their challenges different as well. Keep scrolling to see for yourself!

# what is your biggest challenge in software development?



# what have you done to overcome these challenges?

## Hiring talent

The most important methods our participants use to be able to attract talent are:

- Building an engineering brand
- Advertising more
- Offering higher pay and better benefits
- Working with recruiters

Building an employer brand in engineering mostly involves giving back to the community. If you give without expecting anything in return, you'll end up gaining recognition and building relationships, which makes hiring easier.

## Capacity

Here are the most popular choices to combat capacity issues:

- Improving prioritization
- Hiring engineers
- Outsourcing to contractors
- Improving processes

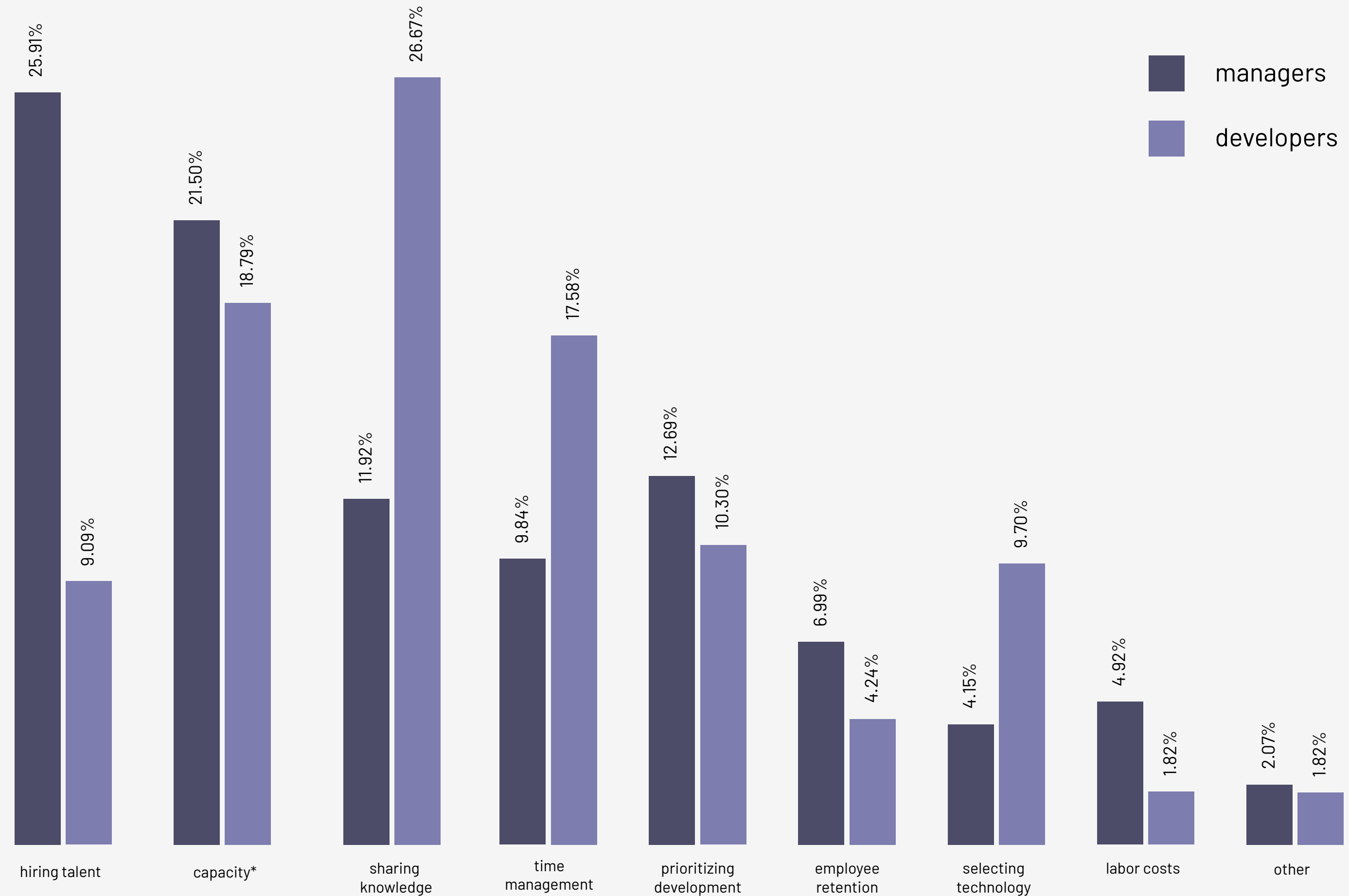
Increasing the available workforce either internally or externally is the most obvious way to increase overall development capacity. On the more interesting side of combating capacity issues, our participants often implement agile methodologies to streamline the workflow and use customer needs as a guide to better be able to prioritize development.

# what is your biggest challenge in software development? (2019-2021)



\*backlog, speed-to-market, etc

# what is your biggest challenge in software development? (2021 - managers vs. developers)



\*backlog, speed-to-market, etc

how has COVID-19 affected your company?

not affected  
at all  
20.92%

negatively  
23.76%

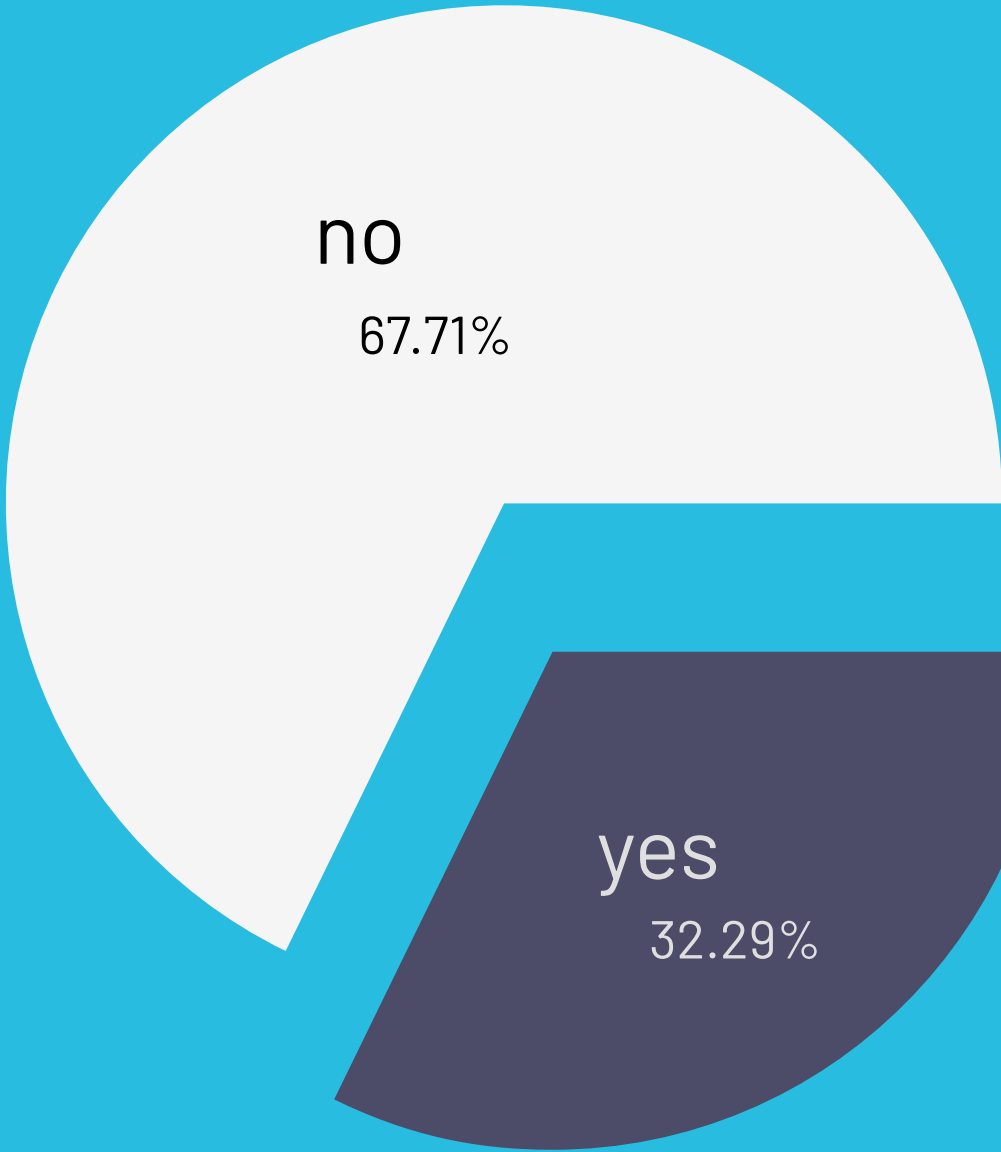


they even out  
32.80%

positively  
22.52%

was your company forced to downsize because of the pandemic?

no  
67.71%



yes  
32.29%



# what challenges has the pandemic added to your daily work?

## 1. Difficulties with communication

The majority of the participants mentioned that the forced remote environment made communication more difficult, causing a wide array of issues. Here are the most common occurrences:

- Lack of water cooler conversations
- Increased overhead in communication
- Asynchronous communication
- More meetings

The lack of personal touch in a remote environment decreased employee retention at many companies, beyond making the day-to-day work more monotonous and less fun.

Not being able to walk over and talk to a colleague also increased overhead on technical discussions, and minor issues often don't even make it to discussions. This made extra meetings necessary, which takes even more time away from software engineers doing focused work.

Overall, remote communication has plenty of room for improvement. If you also struggle with this, check out our podcast episodes on remote work:

- Kate Womersley
- Tim Olshansky

## 2. Work-life balance

Many participants mentioned that working from home made separating personal life from work difficult.

Many people in the industry have trouble focusing on work with many distractions going on at home that they don't have to deal with at the office. Others say working extra hours became regular.

It can turn into a vicious cycle where you have trouble focusing, so you end up putting in extra hours, take less rest, which will cause you to have less focus again.

This is a common issue across the board that may be worth looking into to improve the quality of life for remote workers.

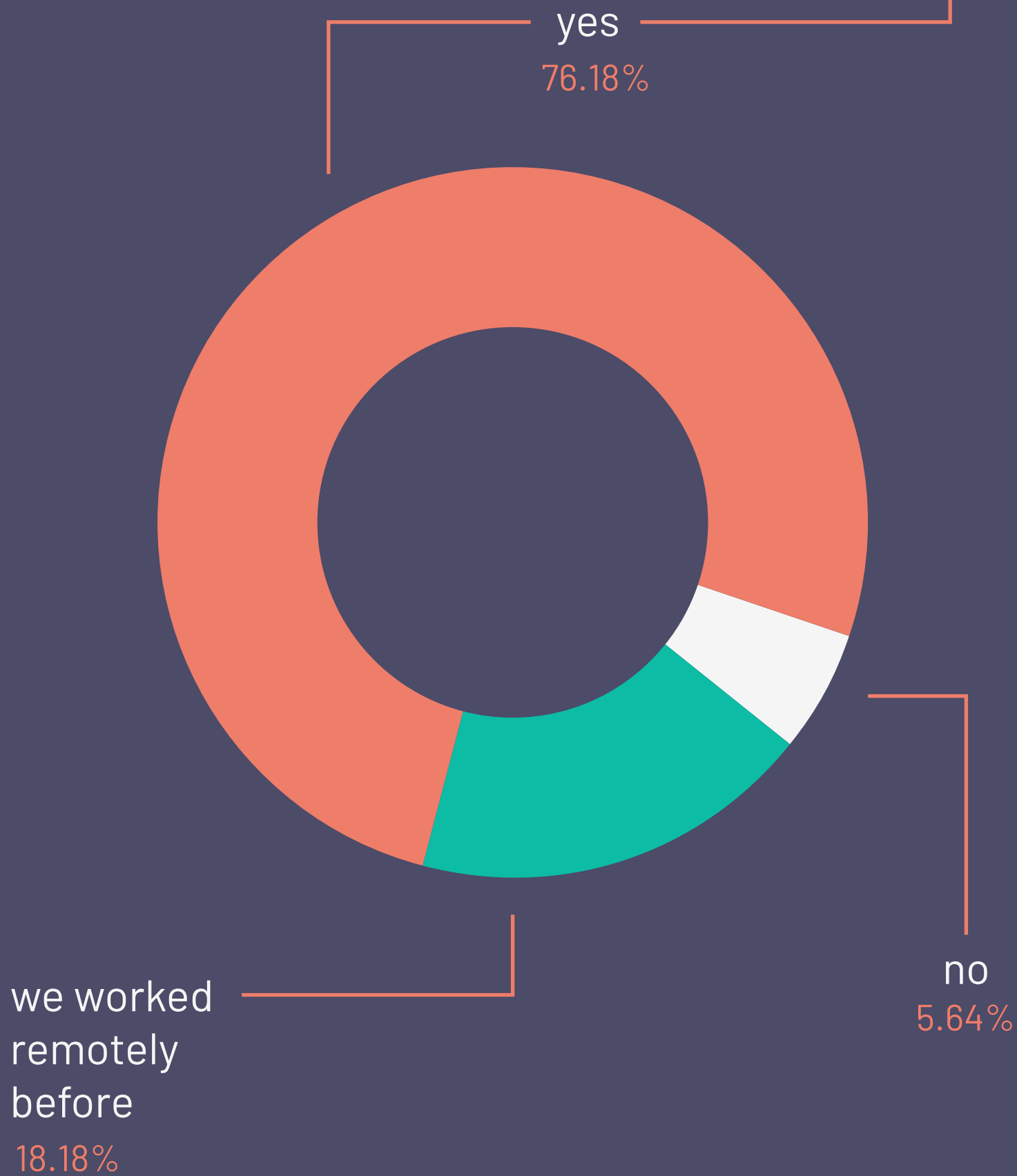
## 3. More stress, burnout, and depression

Slower and often lower quality communication, the lack of human interaction, and difficulties with work-life balance in themselves cause extra stress. On top of these, there is a lot of uncertainty everywhere.

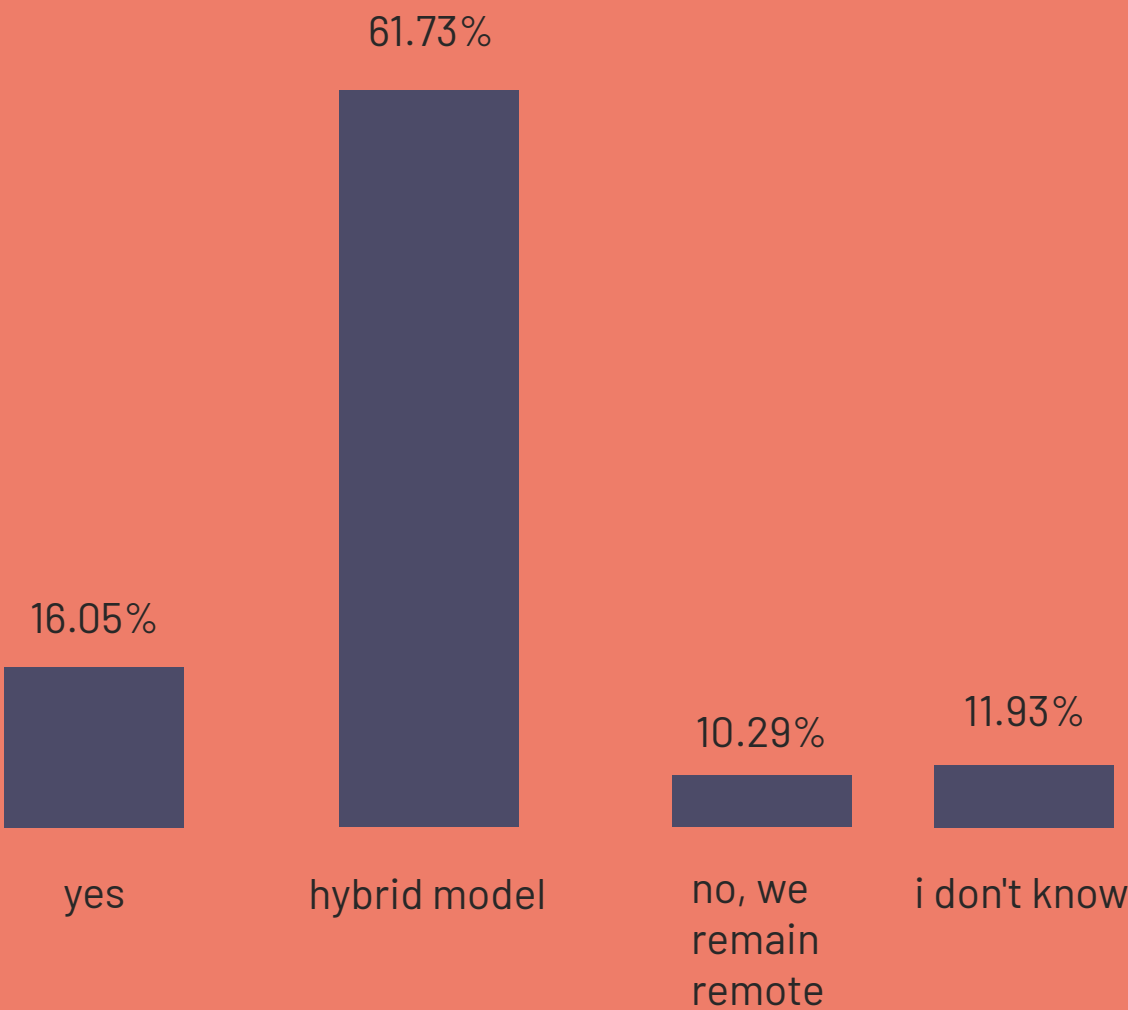
This leads to depression and burnout becoming more widespread issues. They may still be less visible, because you only talk to your colleagues during meetings, as opposed to being around them all day in the office.

Mental health issues of any level are certainly real in the current atmosphere, and they deserve extra attention from employees, managers, and more senior leadership.

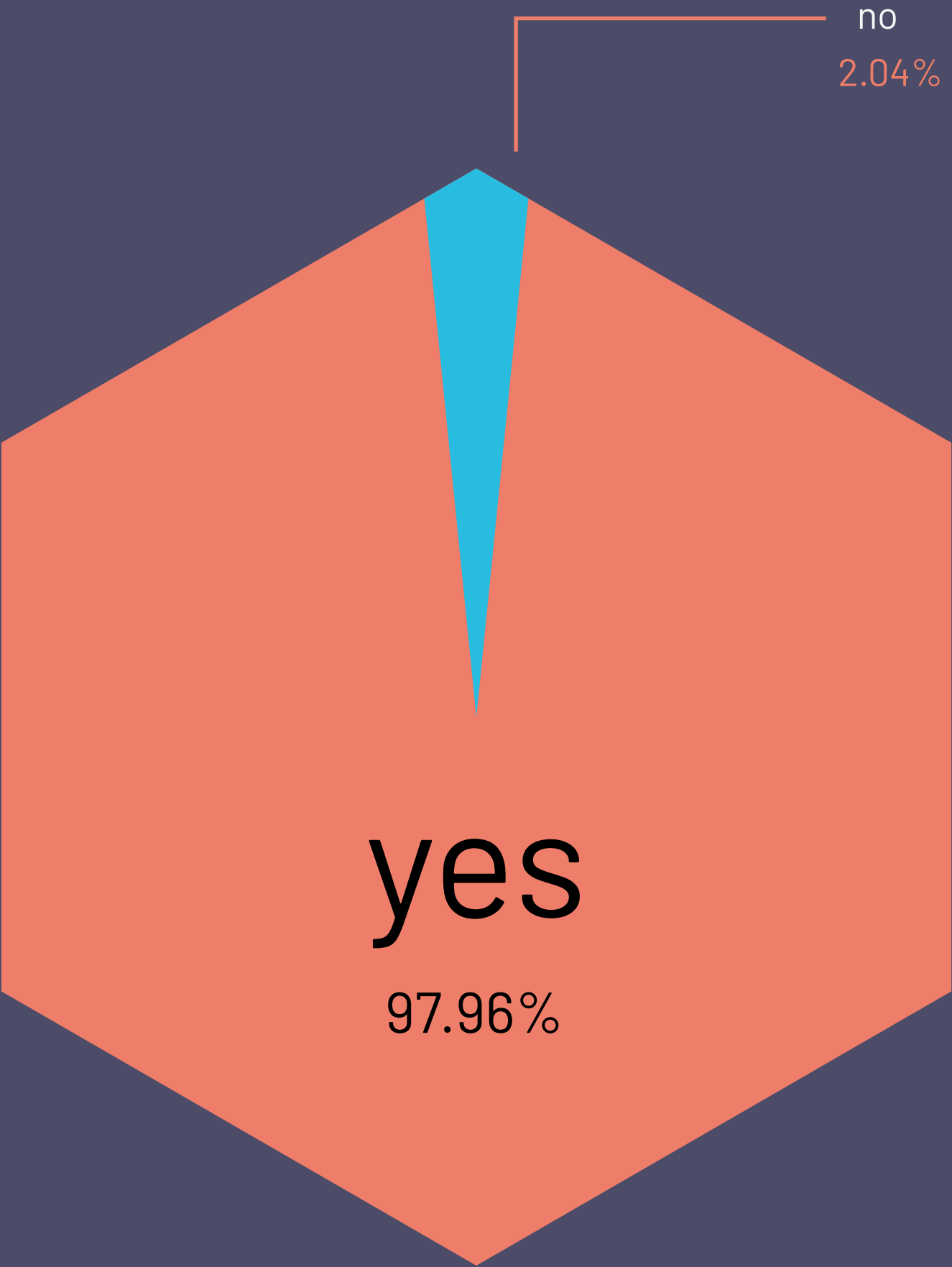
have you instituted remote work specifically because of the pandemic?



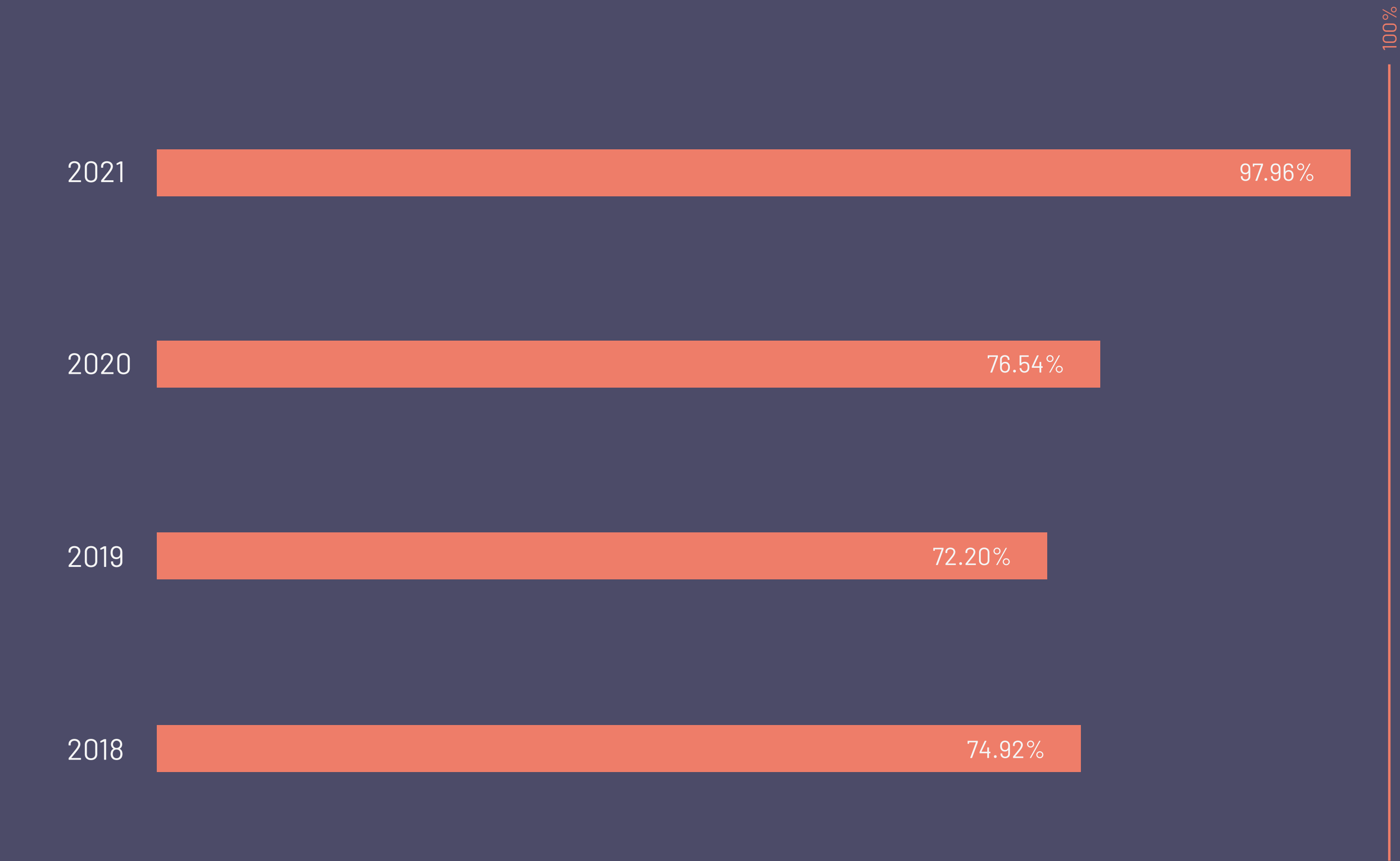
is your company planning to switch back from remote work after the pandemic?



is remote work allowed at your company?



percentage of companies allowing remote work (2018-2021)



# Interview with Jerie Shaw

Senior Technical Program Manager, Shopify



“Early on, we underestimated the impact of social isolation on new hires working remotely.”

Check out the interview here:

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## Using the camera helps

It's part of the culture at Shopify to turn the video and audio on at virtual meetings. Seeing people smile, nod, or simply sit and pay attention is important to human connections.

Using the camera isn't required, there may be reasons for turning it off at any time. Most employees use cameras anyway, and it improves the experience.

## Example from Shopify's remote onboarding

In week three, new hires spend the entire week shipping a data pipeline.

We start each day with a 30-minute call with a group of new hires to explain the task for the day, for example, designing a data model. Then we let them go and work on it, but they stay online in a Slack channel and in a virtual pod.

A virtual pod is a Google Hangouts meeting that stays open on the second monitor. Turning off the microphone or the video is okay, but it gives them the option to unmute as if they'd turn to a neighbor at the office and ask for help.

More experienced employees drop in at certain points during the day when the new hires are likely to have questions.

At the end of the day, we make a group call to debrief and discuss what has happened. We send their deliverables to their managers for feedback.

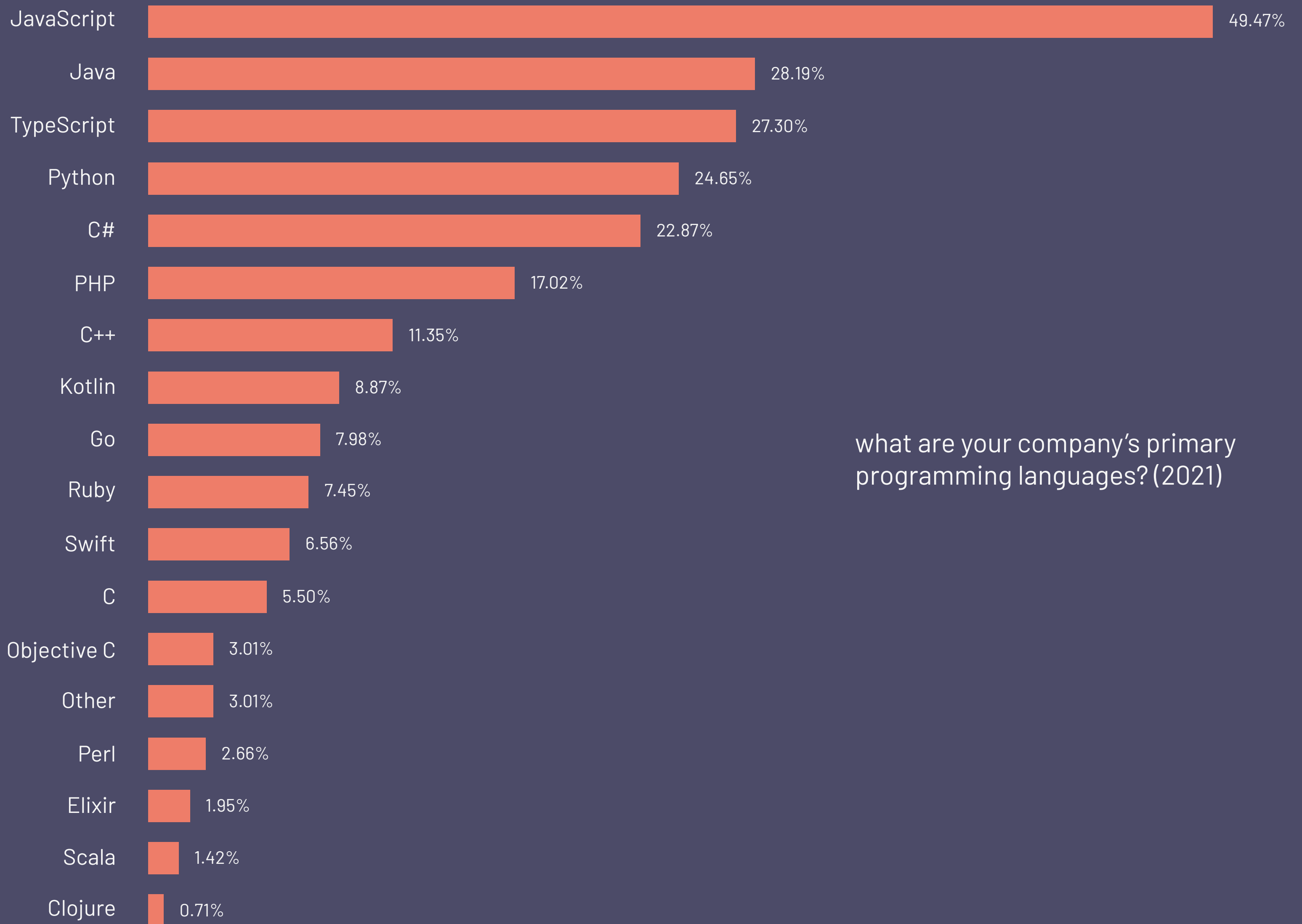
This only requires spending an hour in a video call each day, but they get the experience of working with a group.

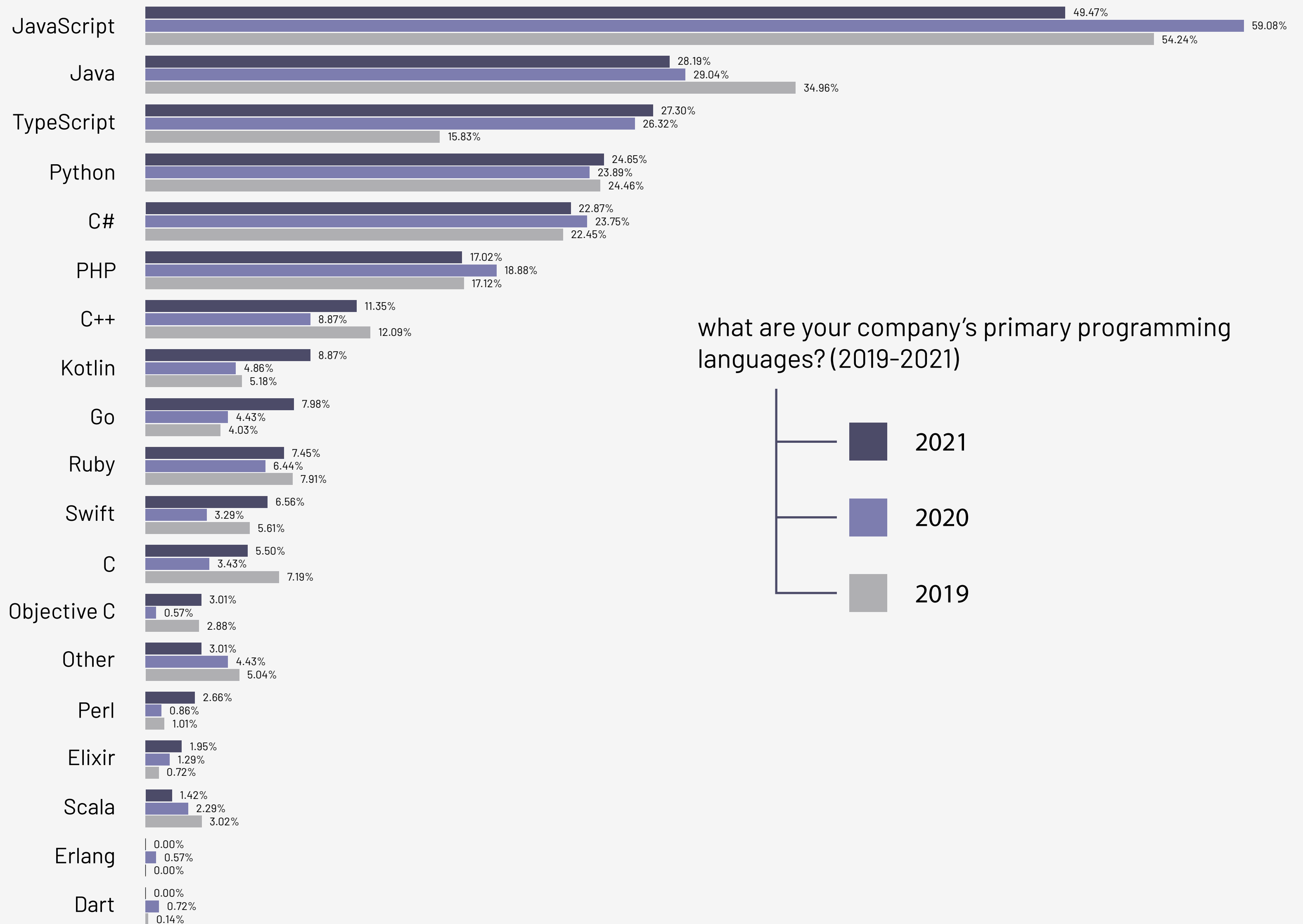
# tools and tech

This section shows the most popular programming languages and tools developer teams use for testing, project management, version control, and communication.

Developer teams use a wide variety of tools (especially for testing and project management), which makes it especially hard to present the tools on a chart. The charts show a few industry-leading tools, following an army of tools forming at the tail end.

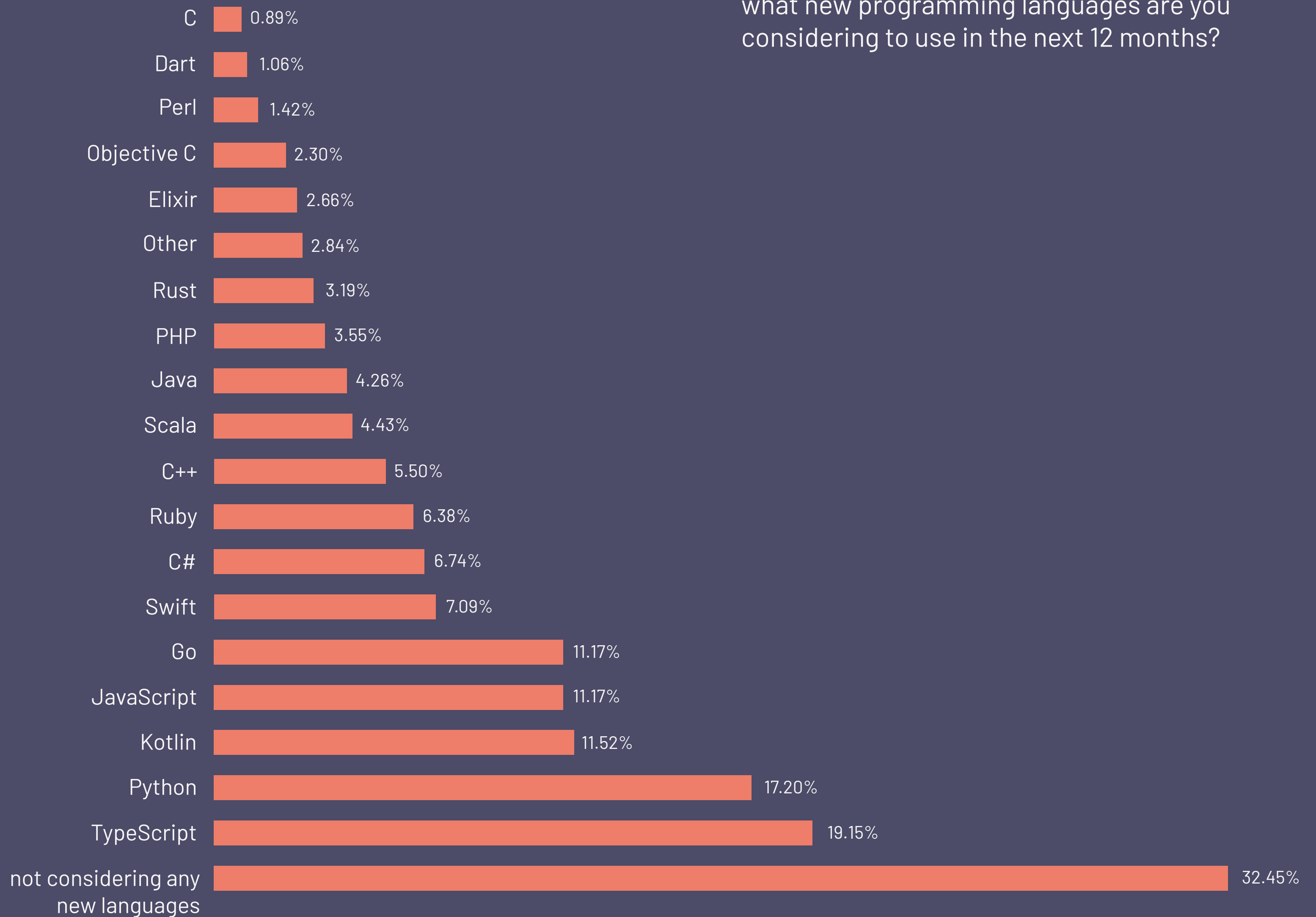
On the programming languages' side, it's exciting to see how newer technologies are gaining momentum and climbing in popularity.



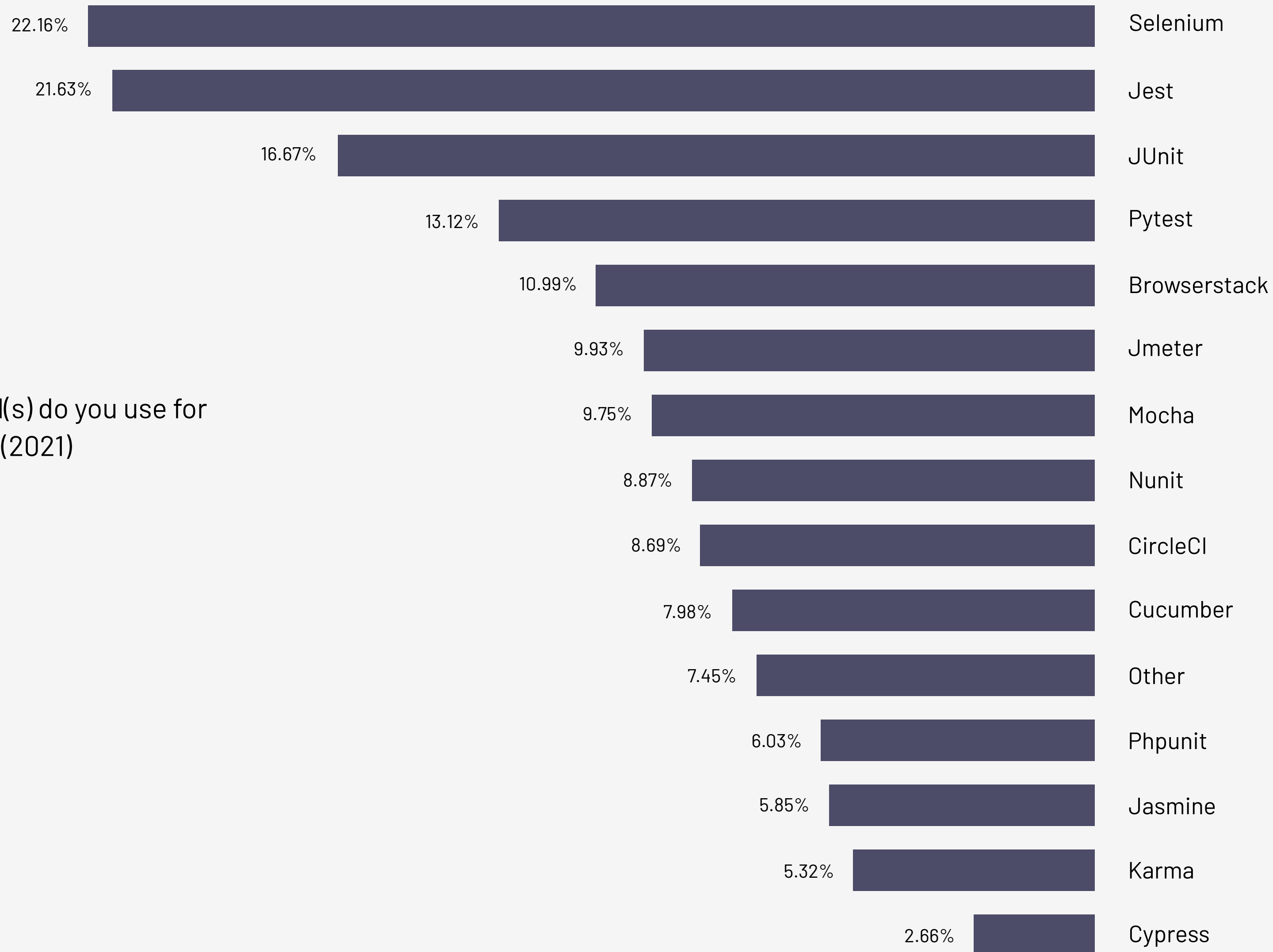




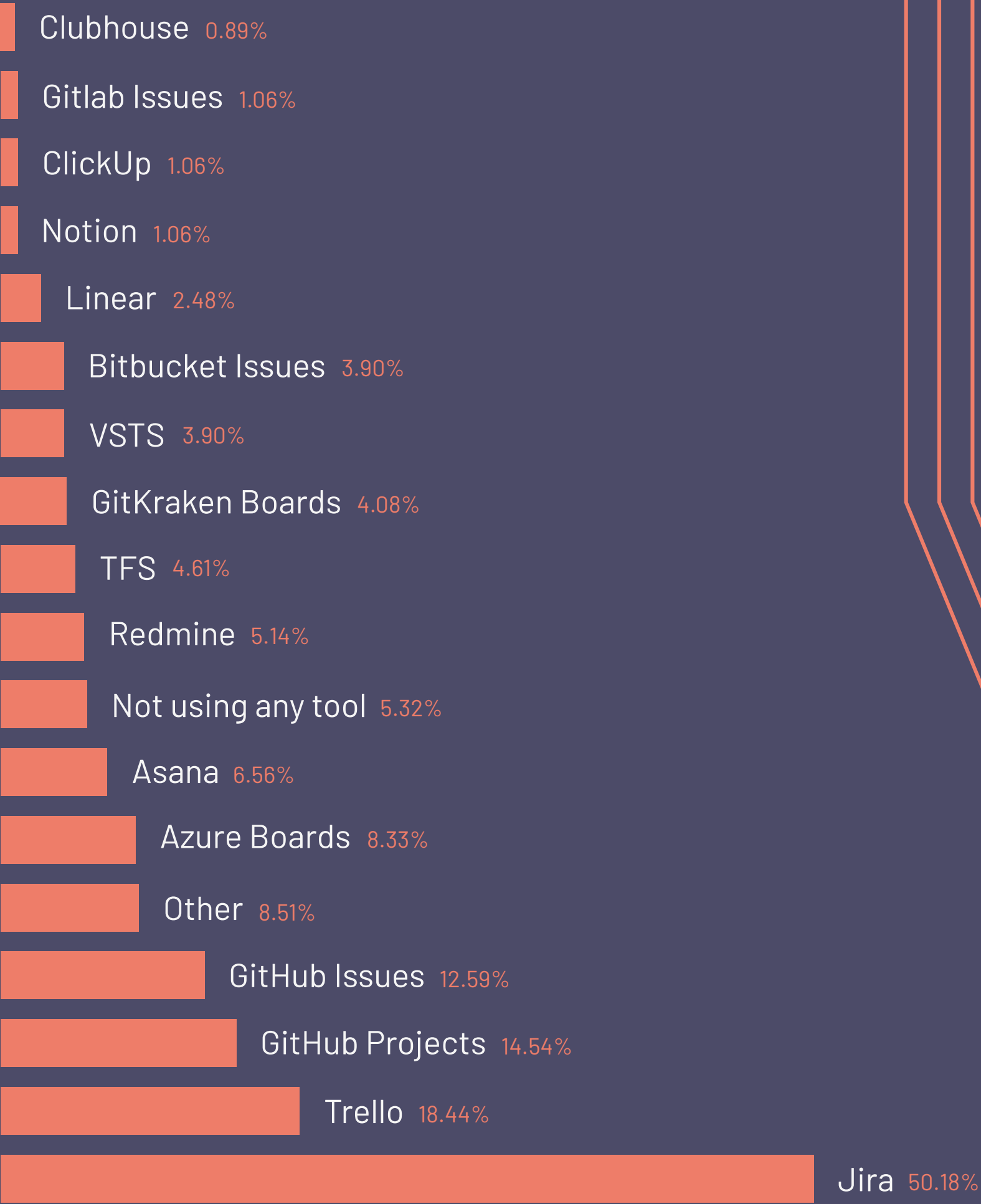
what new programming languages are you considering to use in the next 12 months?



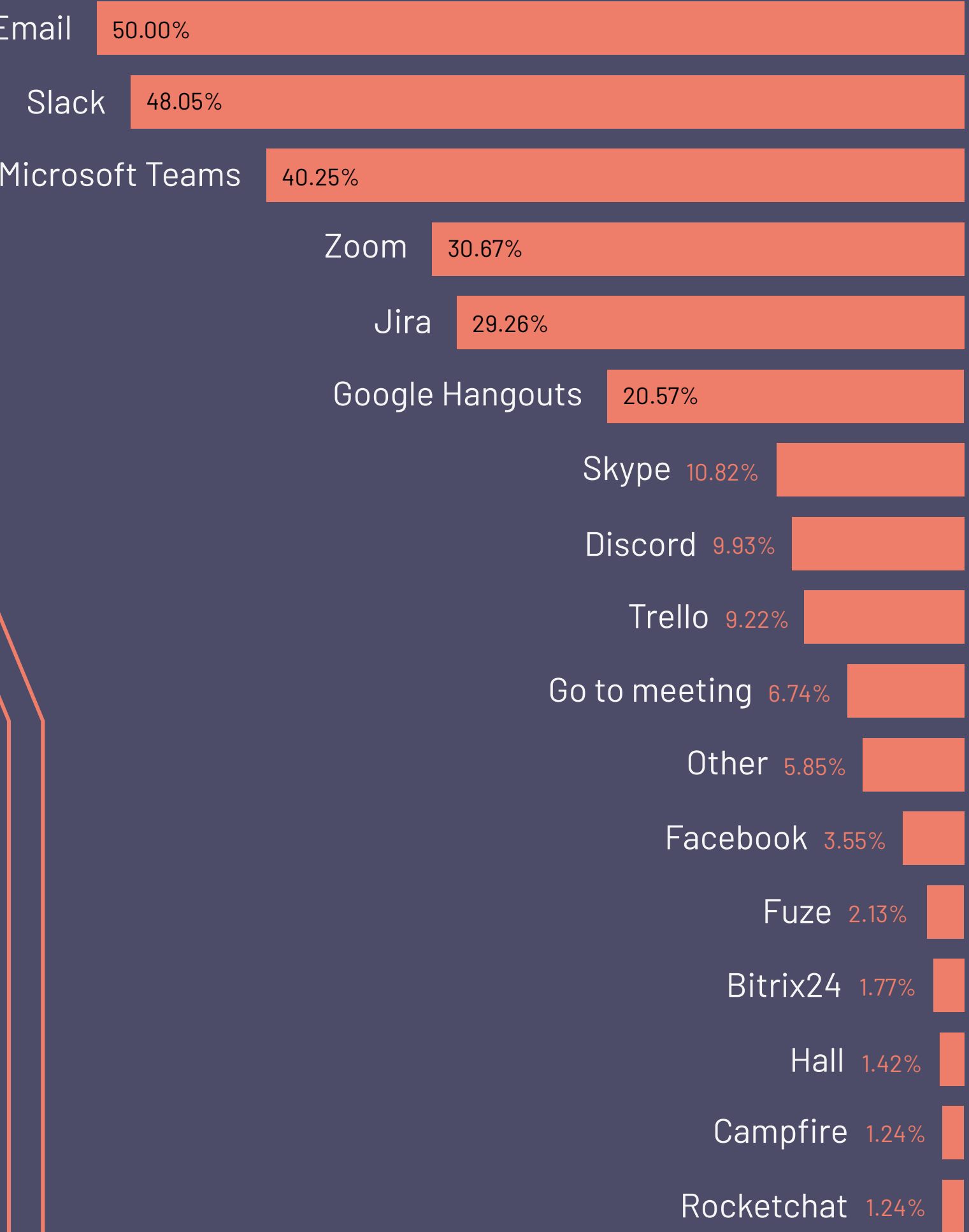
what tool(s) do you use for  
testing? (2021)



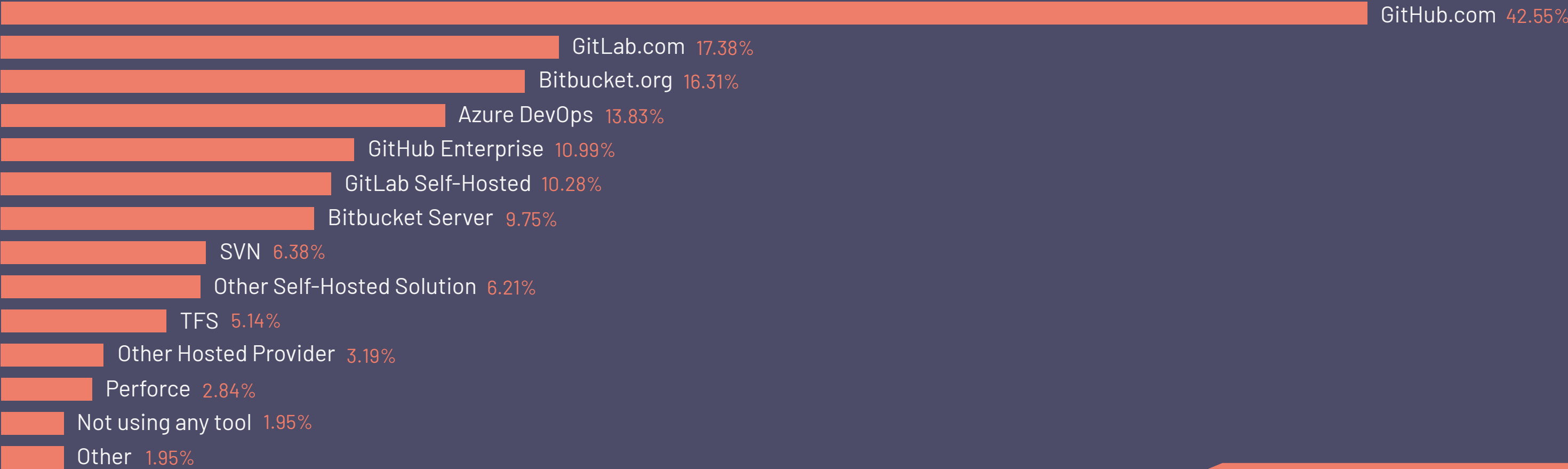
what tool(s) do you use for project management? (2021)



what tools do you use to communicate during a project? (2021)



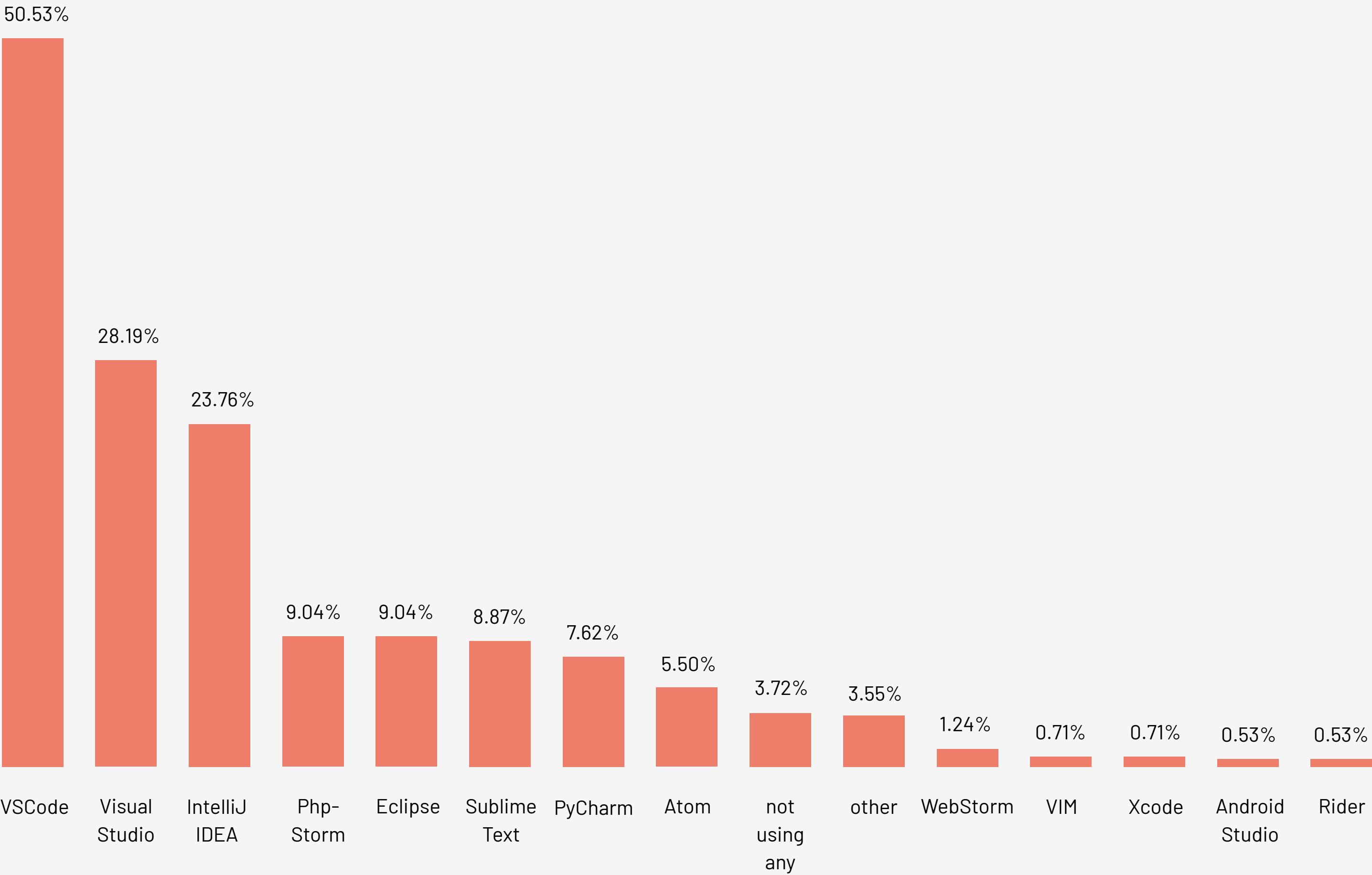
# what version control system do you use?



# what source control client(s) do you use?



what IDE(s) do you use?



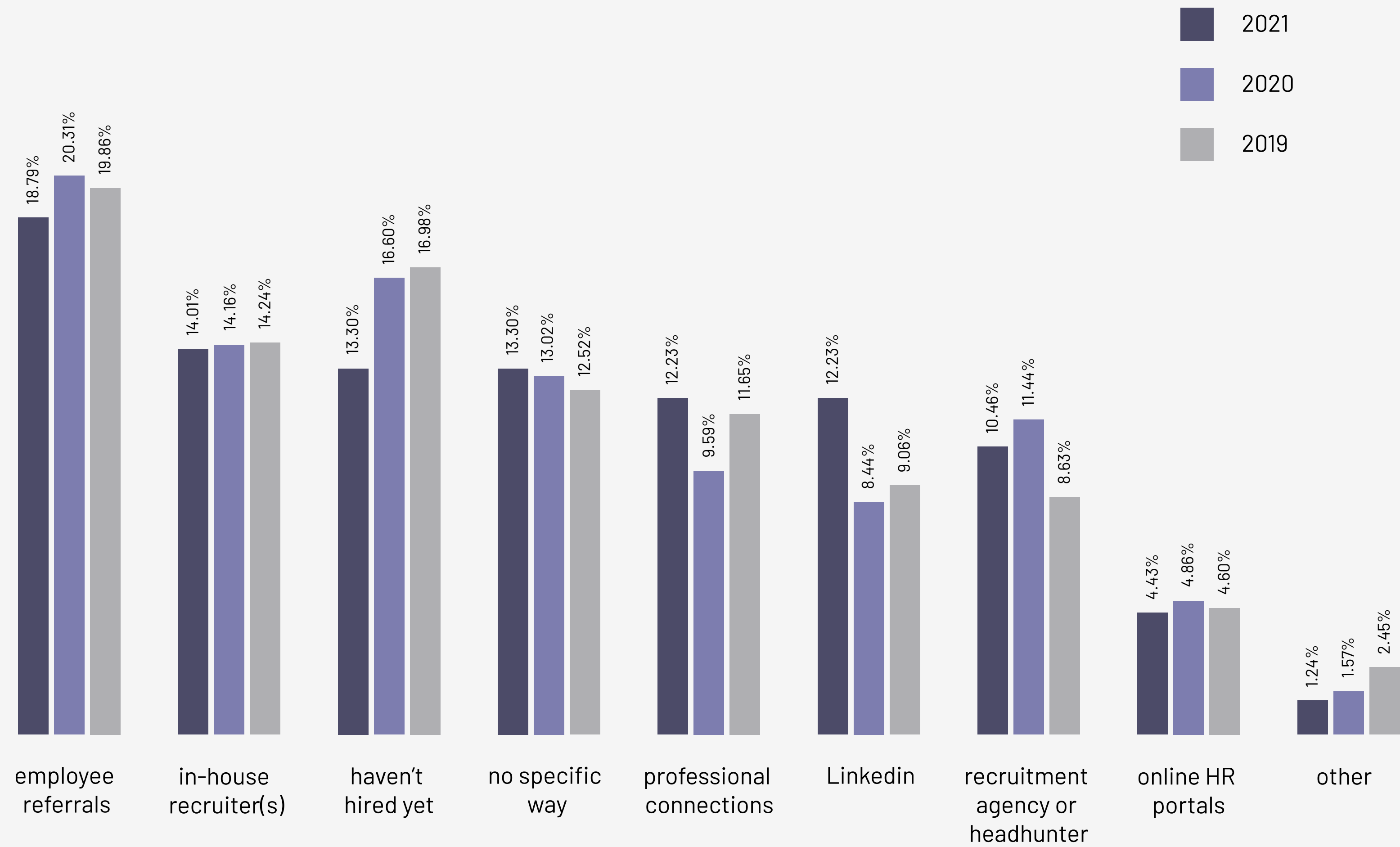
# hiring talents

Hiring is the top challenge in the industry currently, while retention has become a more serious issue in a remote environment. We wanted to learn more about how tech companies deal with this.

Since 2018, the most effective hiring methods haven't changed. Employee referrals and having in-house recruiters are the best ways to hire talent.

This chapter also covers statistics on hiring criteria and employee retention, segmented by top- and average-performing teams to see if there are differences. On top of this, we compare results with previous years to show emerging trends.

what's your most efficient method to hire talent for software development? (2019-2021)



# Interview with Sarah Wells

Technical Director, Financial Times



“When building an engineering brand, the go-to move is content like blog posts, podcasts, books, or speaking at conferences. If your existing employees like it, you’re on the right track.”

Check out the interview here:

**LEVEL-UP**  
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People often start thinking about an engineering brand when they’re thinking about recruiting engineers. Developers have opportunities to join many different companies.

You want people to look at your job specification and think, “I’ve heard the Financial Times talking at a conference. They seemed to understand technology, and their engineering culture looked interesting and inclusive.”

## 1. Figure out your engineering brand

The first challenge is that you may not know what your brand is. You may have never had conversations about what it means to be in your engineering department. It rarely comes up until you start thinking about how to represent it.

You might find that not everyone has the same view about what your brand stands for. Figuring it out isn’t easy.

## 2. Put in time and effort

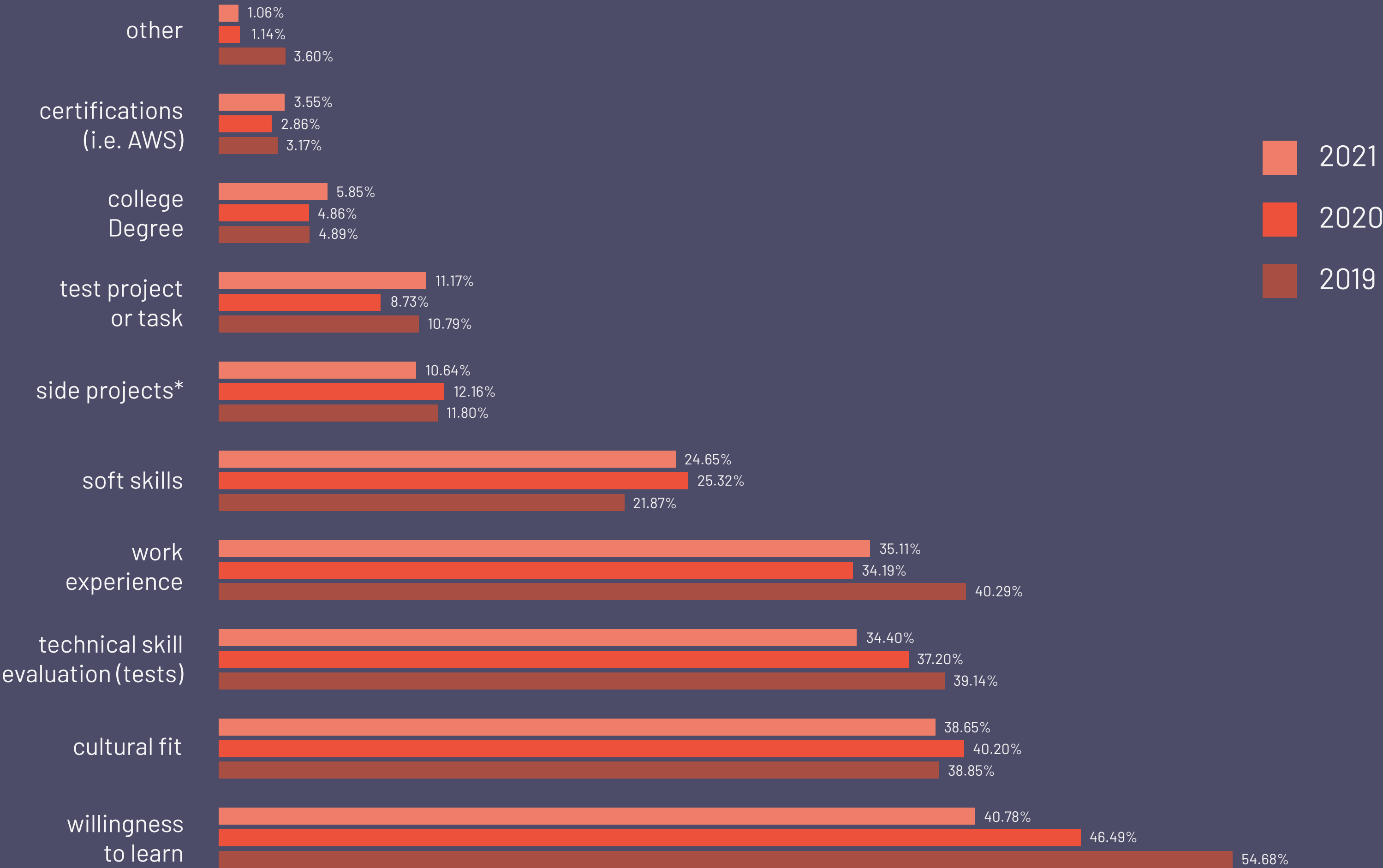
The second challenge is that it takes time and effort. You need people who take it seriously and maintain the effort in the long run.

You don’t want to publish a couple of blog posts and just stop. You need to be out there, continuously communicating in different ways, like writing blog posts and attending conferences. These provide opportunities for you to reach the type of people interested in what you’re doing, and make an impression or even directly connect with them.

To have a real impact, you want people to know that they can come back later and read more interesting stuff. Maintaining a pipeline of content and making sure that people always feel supported to go out and do talks takes a lot of work.

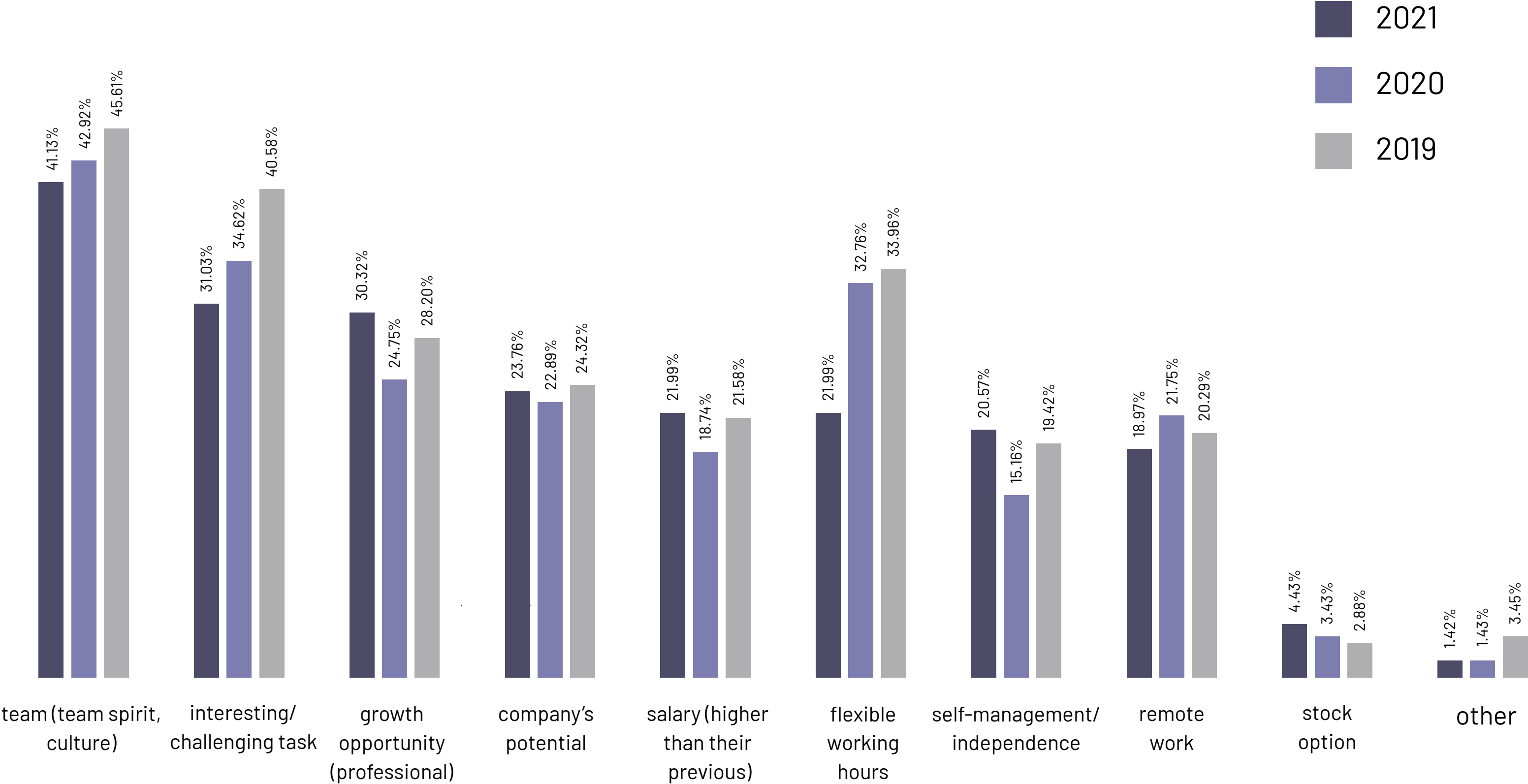


what are your most important hiring criteria? (2019-2021)

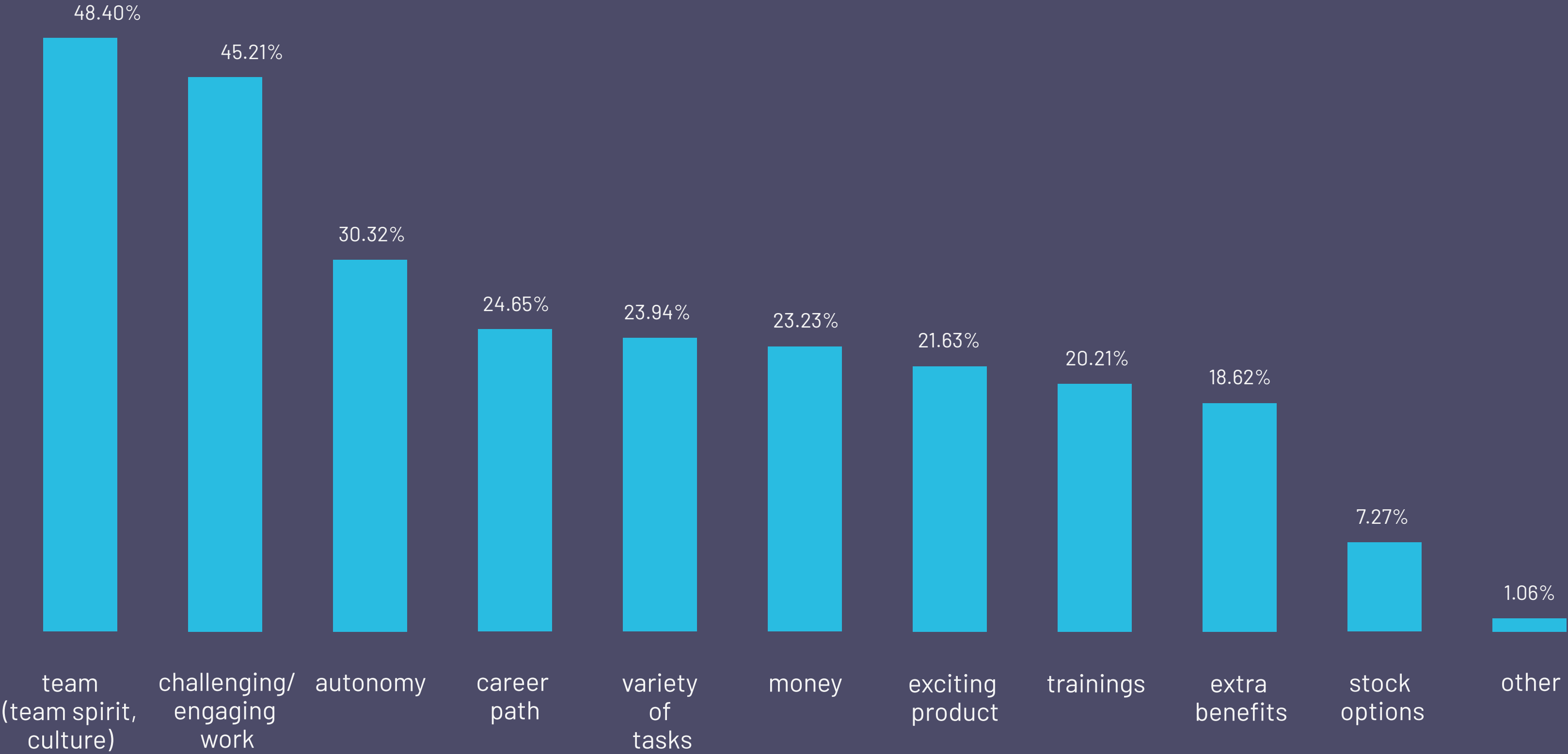


\*apps, libraries, frameworks etc.

how do you attract new software developers? (2019-2021)



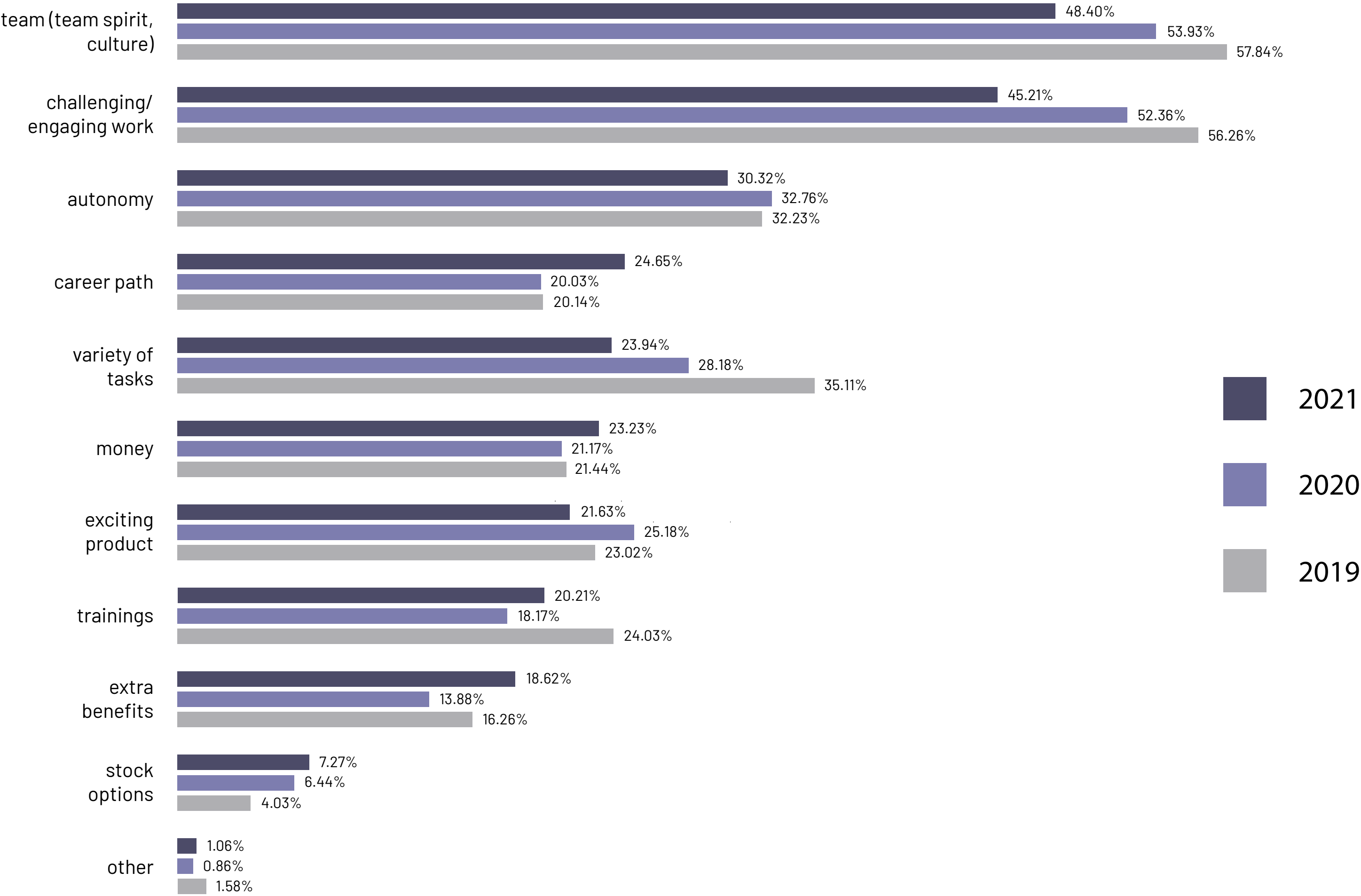
how do you keep software developers motivated? (2021)



how do you keep software developers motivated?  
(2021 - top vs average performers)



how do you keep software developers motivated? (2019-2021)



# software development outsourcing

Since dealing with capacity issues is one of the biggest challenges along with hiring talent, outsourcing seems like a quick fix.

This chapter presents data on the proportion of companies that outsourced software development in the last 12 months and also the ones that are planning to do so in the next year. We also were interested in if they were satisfied with the outsourcing partner's performance.

have you outsourced software  
development fully or partly  
in the last 12 months?

yes

41.67%

no

58.33%

to whom?

software development company

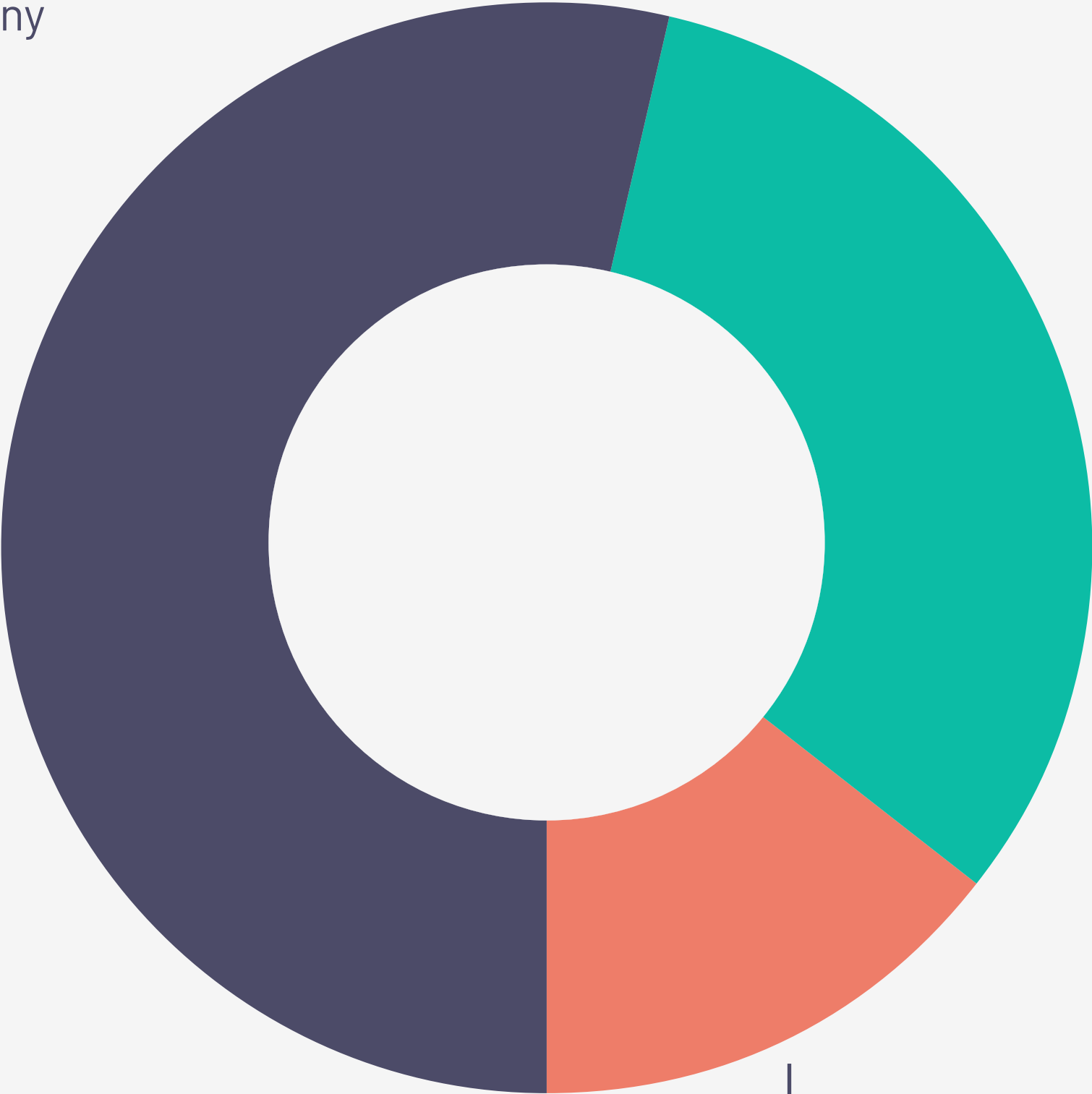
53.62%

freelancer

31.91%

both

14.47%

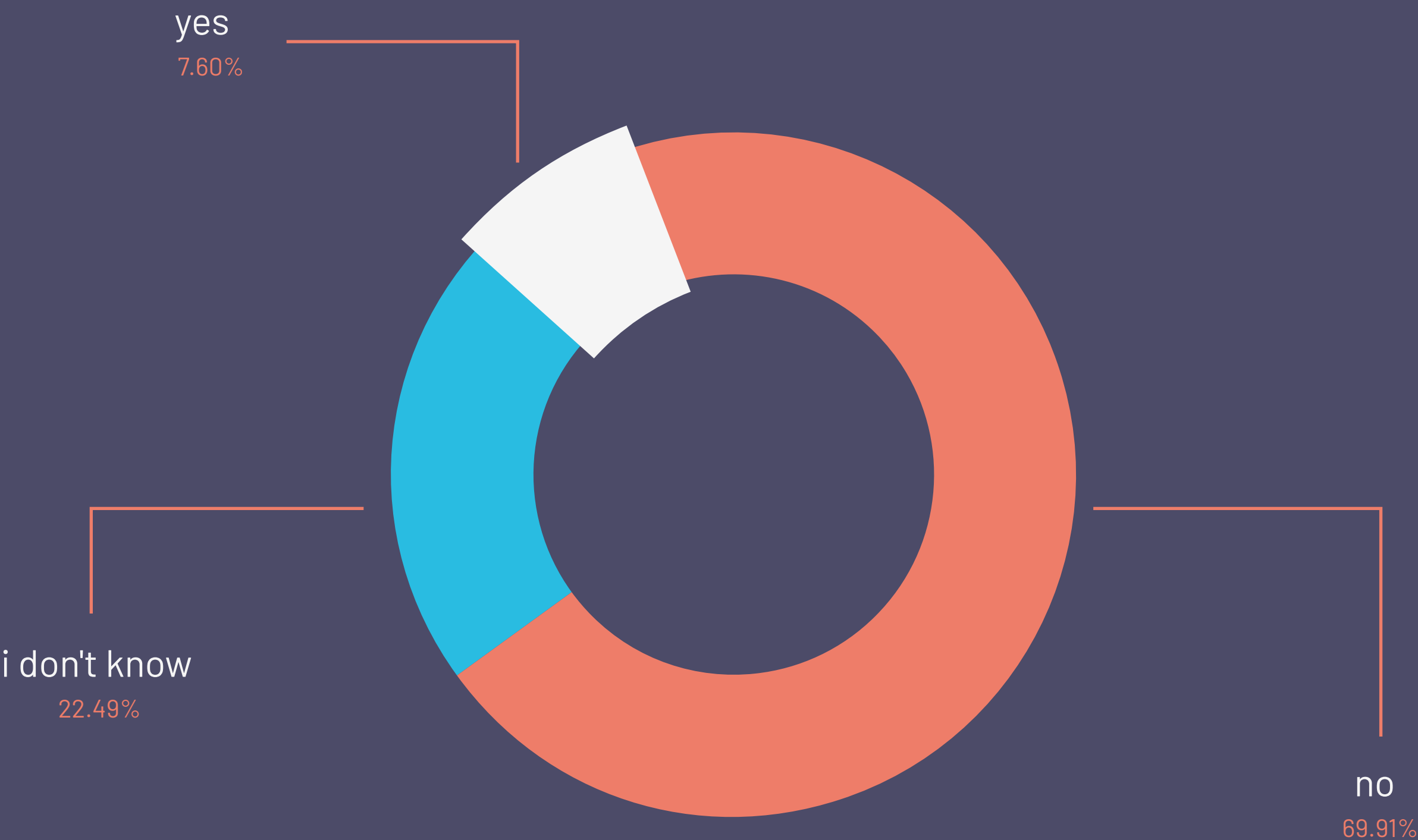




how satisfied were you with the results?



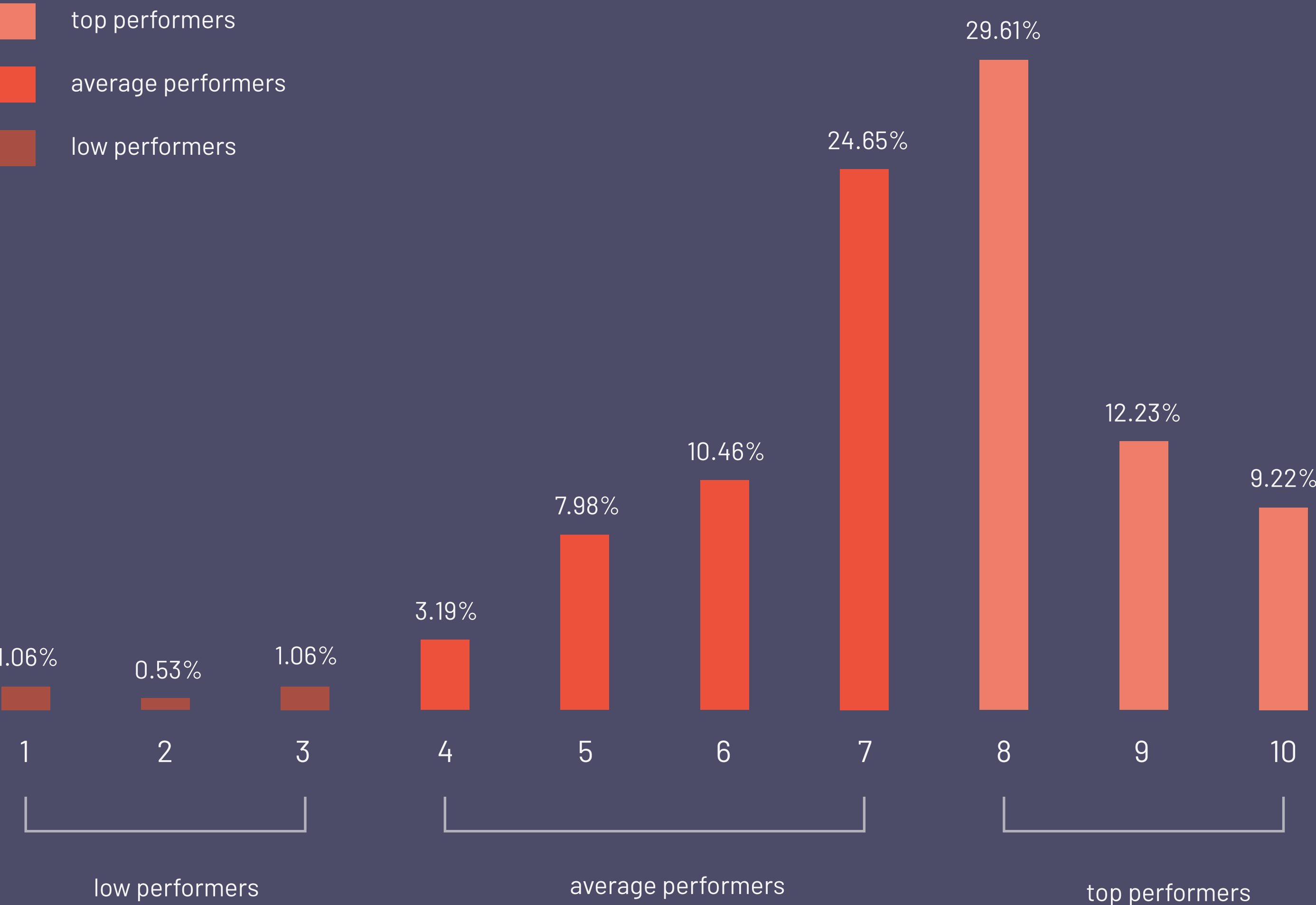
are you planning to outsource software projects in the next 12 months?

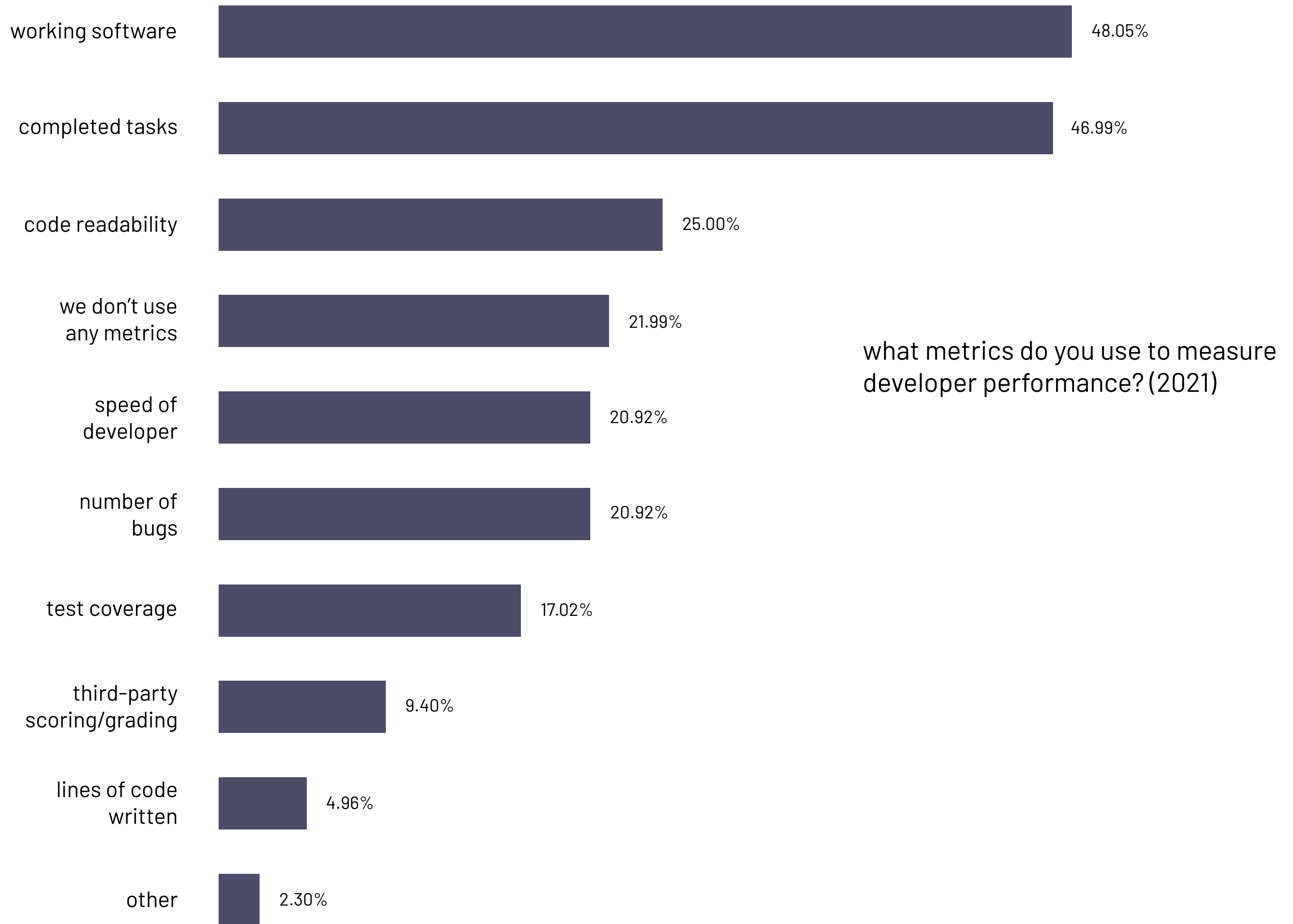


# performance measurement

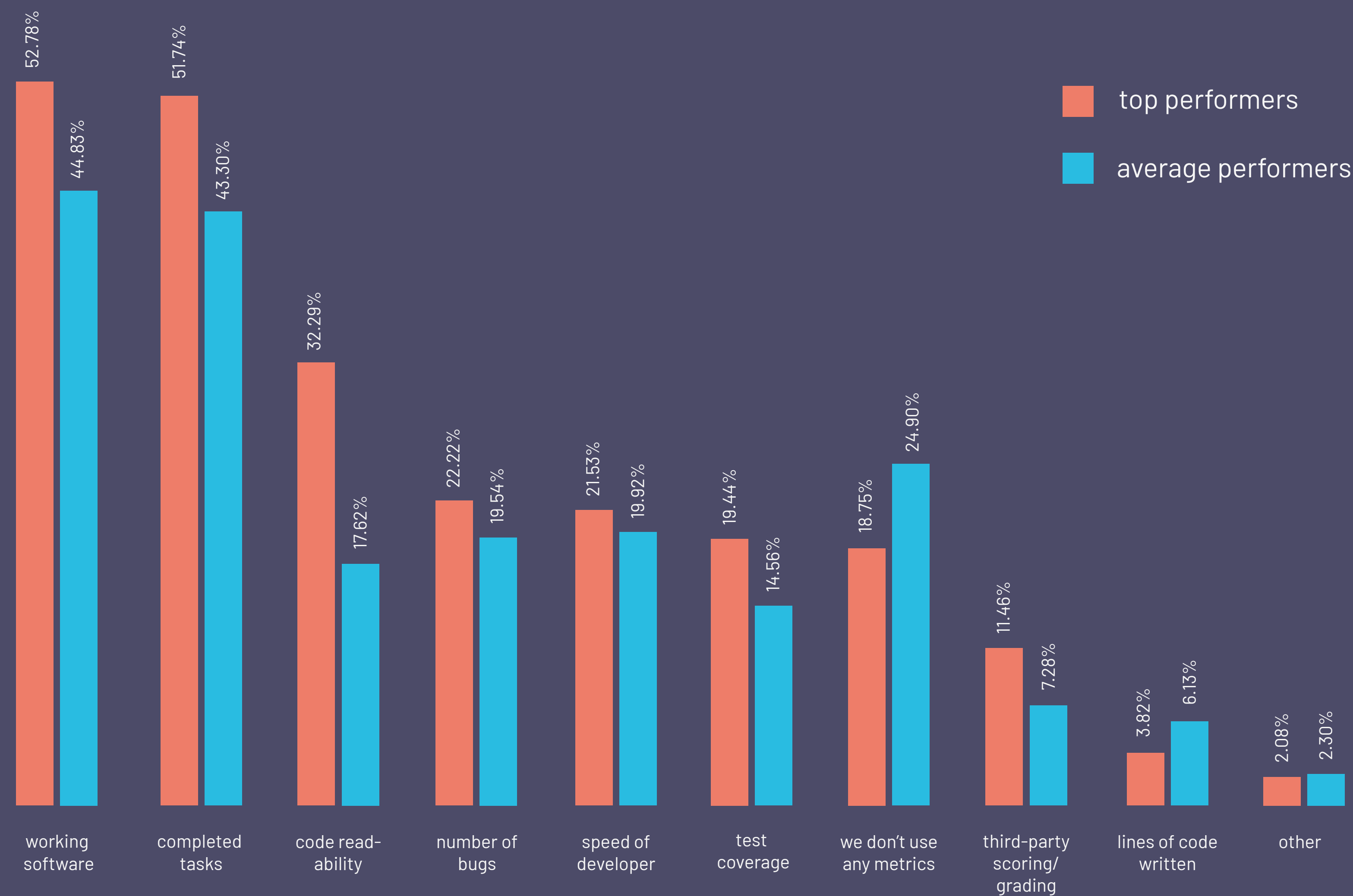
What are the differences between top- and average-performing teams? In this section, we dig deeper into how software teams measure performance and what the number one cause of delivery problems is.

how effective is software development at your company?

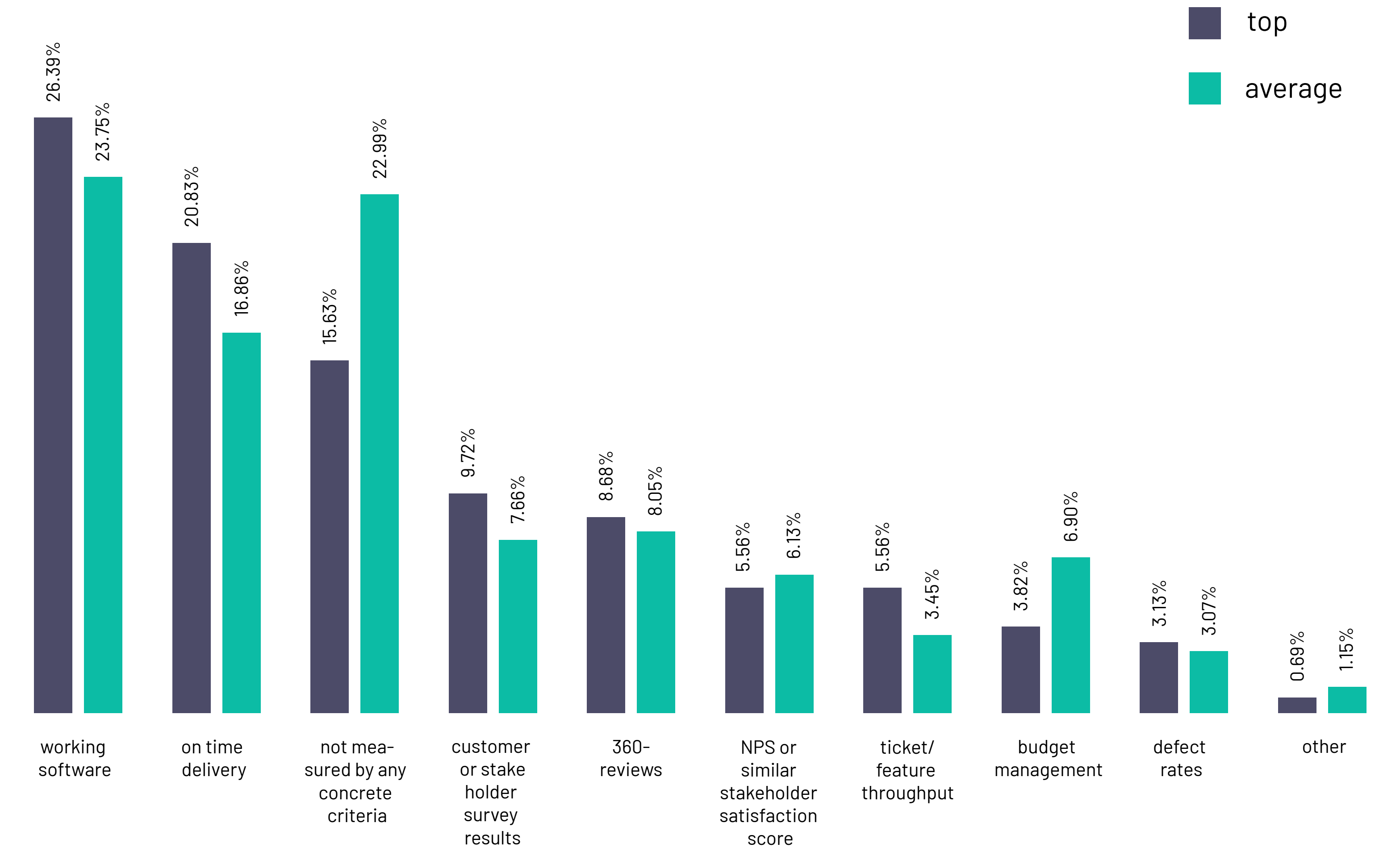




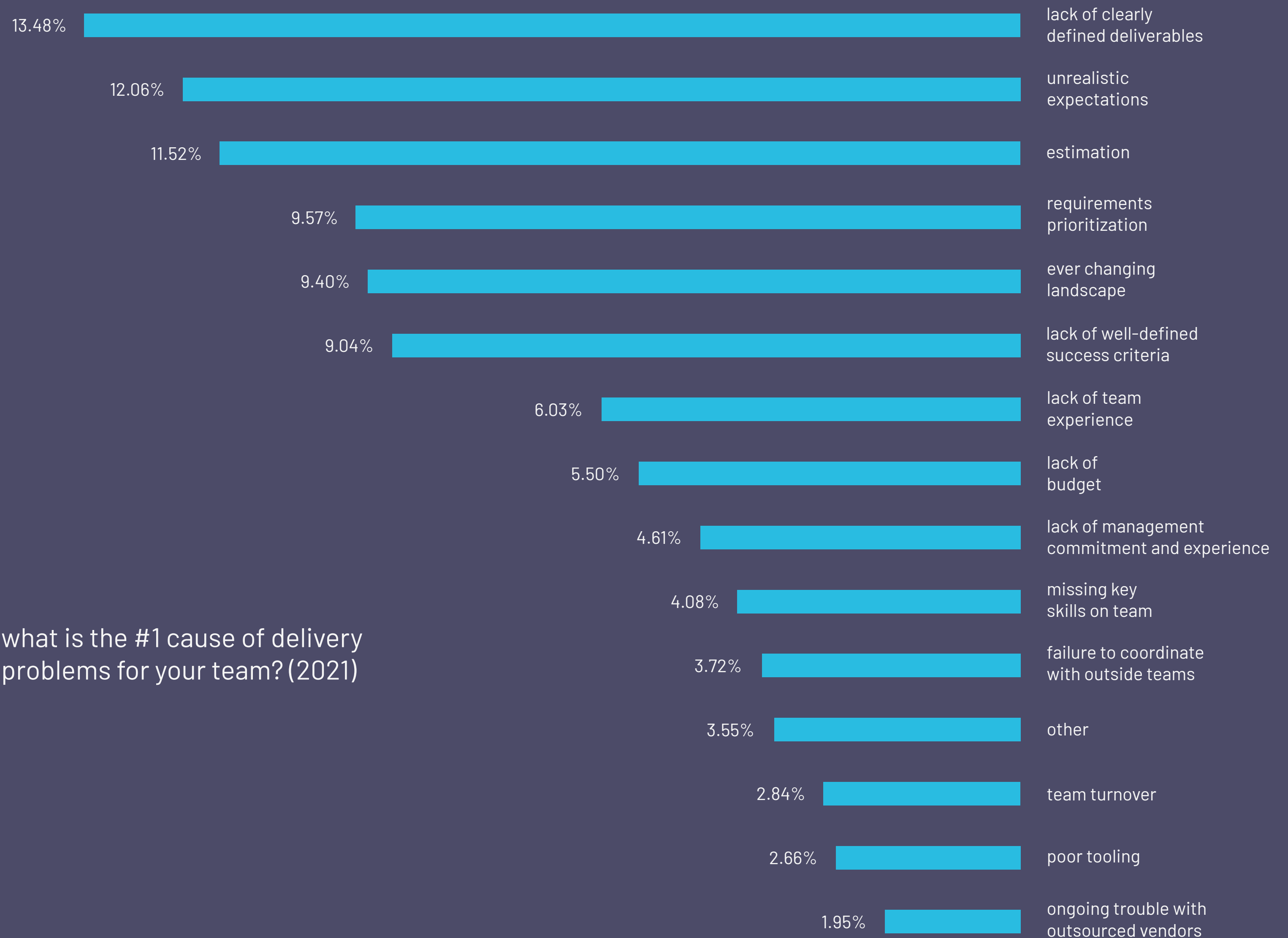
what metrics do you use to measure developer performance?  
(2021 - top vs. average performing developer teams)



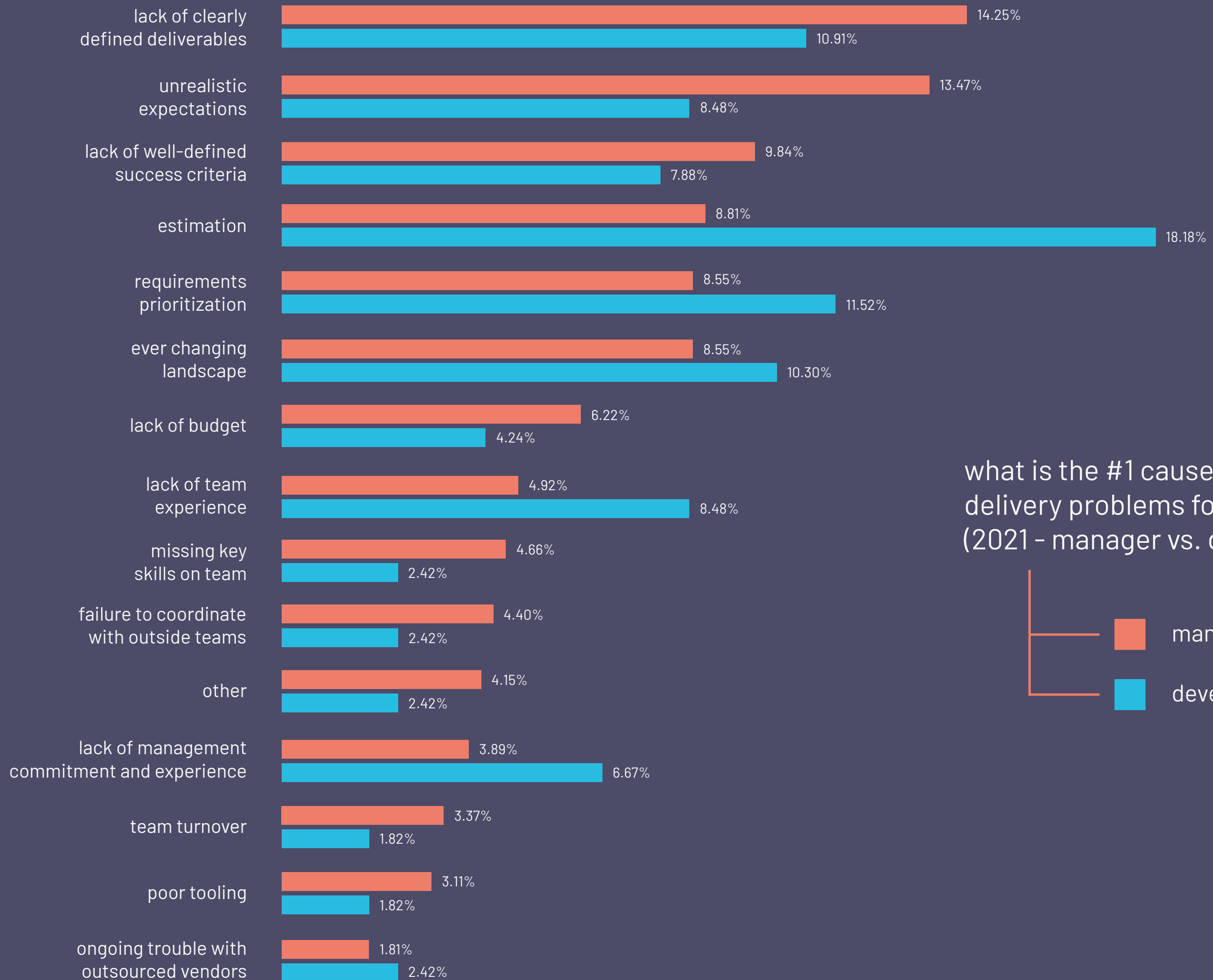
what is the #1 measured criteria for success of software development managers?  
(2021 - top vs. average performing developer teams)



what is the #1 cause of delivery problems for your team? (2021)

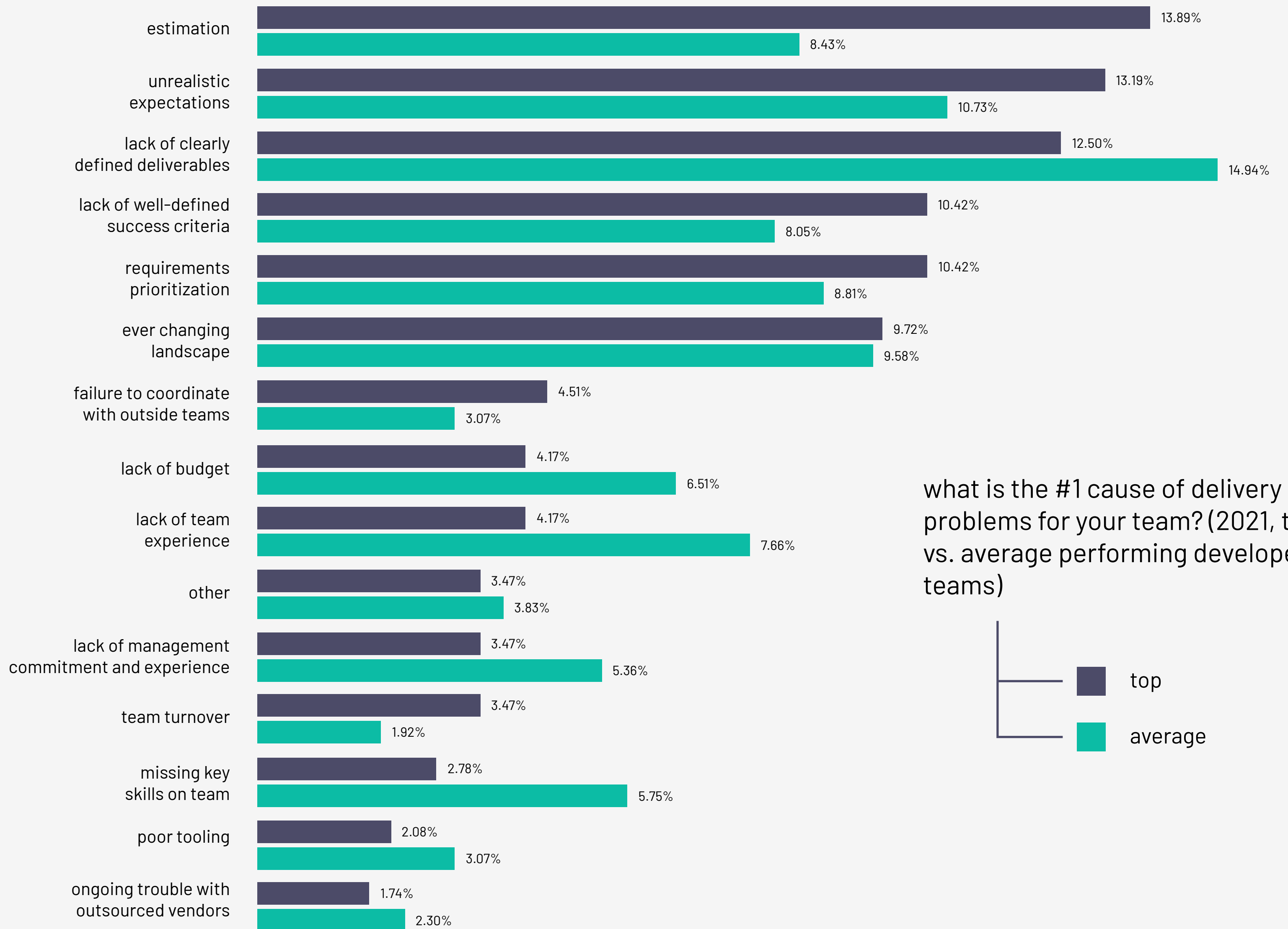




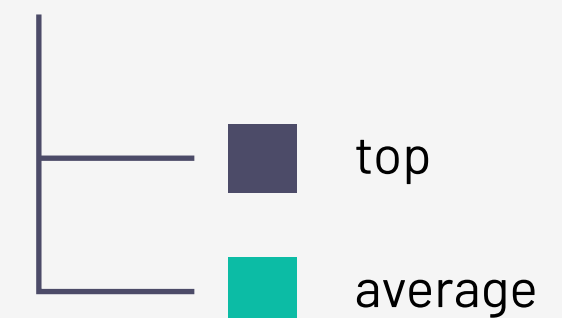


what is the #1 cause of delivery problems for your team?  
(2021 - manager vs. developer)





what is the #1 cause of delivery problems for your team? (2021, top vs. average performing developer teams)



# Interview with John Ford

VP of Engineering, LogMeIn



“When you take over a team, get a comprehensive perspective about them. Make sure you understand the context, talk to stakeholders outside the team, and examine the team’s background.”

Check out the interview here:

**LEVEL-UP**  
**ENGINEERING**  
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A team that lacks engagement, expertise, or if it has lots of infighting will unavoidably underperform. The leader needs to identify the root problems.

When the problem is with the people, you can usually solve it by getting a few people off the team. The rest of the team will often thank you for this because they tend to know who causes issues.

This is what I look at when probing team members:

## 1. Backlog

Take a look at the work they have done, the work they haven't done, and what's in their backlog. You get to see how easy or hard the tasks are that they've been working on, and you get an idea about their productivity.

## 2. Attitude and relationships

Talk to each team member to get a feel for their attitudes. People acting like they know everything raise a red flag. No one knows everything, and this kind of arrogance can hurt the team. It's also worth looking at their relationships with stakeholders. This helps you figure out if a person is a good colleague, or if they aren't great at human interactions.

## Engagement

Leadership plays a huge role in building engagement. You need open, honest, transparent communication. Even if you can't tell everything about a specific topic, share as much information as you can.

On the other side, your people need to know that they can share confidential information with you, and you're not going to pass it on. You don't have to take trust to a personal level, but your team needs to trust you on a professional level.

# about this survey

This year's State of Software Development survey had 564 respondents, all of them are professionals from the software industry. This chapter provides more info about who they are, what kind of company they work for and where they're based.

to whom does your company primarily sell?

B2B

67.91%



B2C

21.63%

B2G

7.45%

other

3.01%

where are you based? (in which continent is your company based?)

Europe

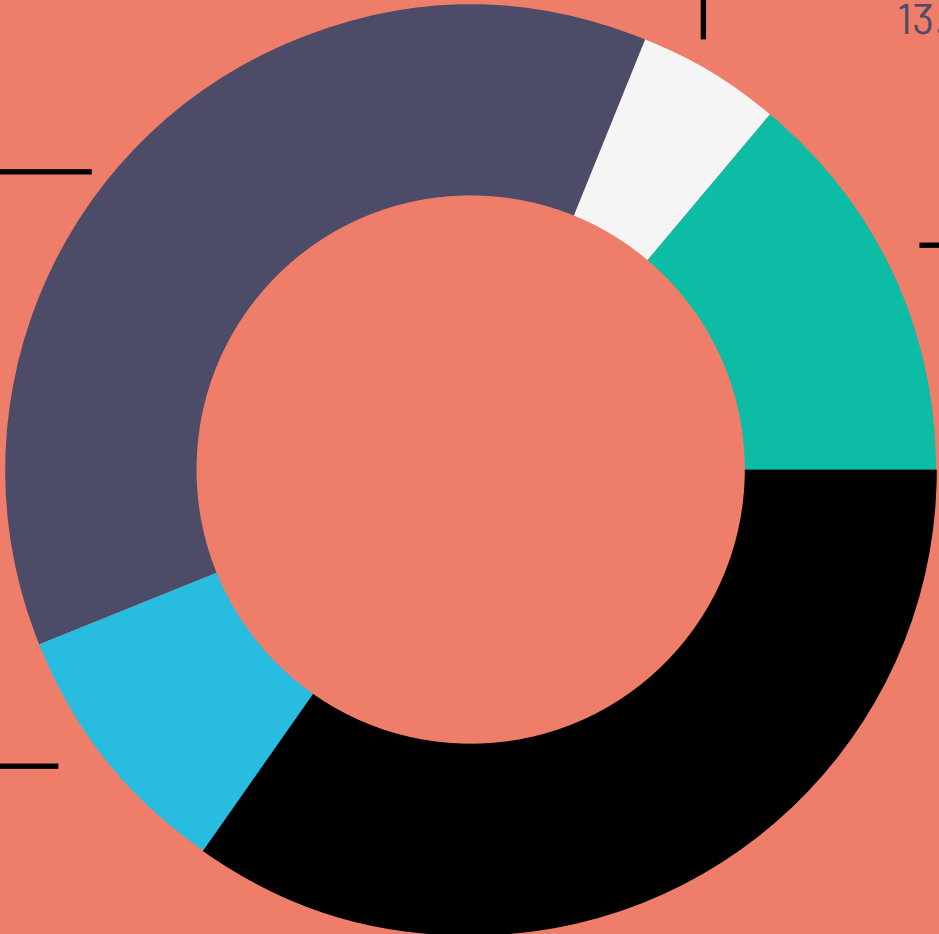
37.23%

Middle East, Africa

5.14%

Asia & Australia

13.65%



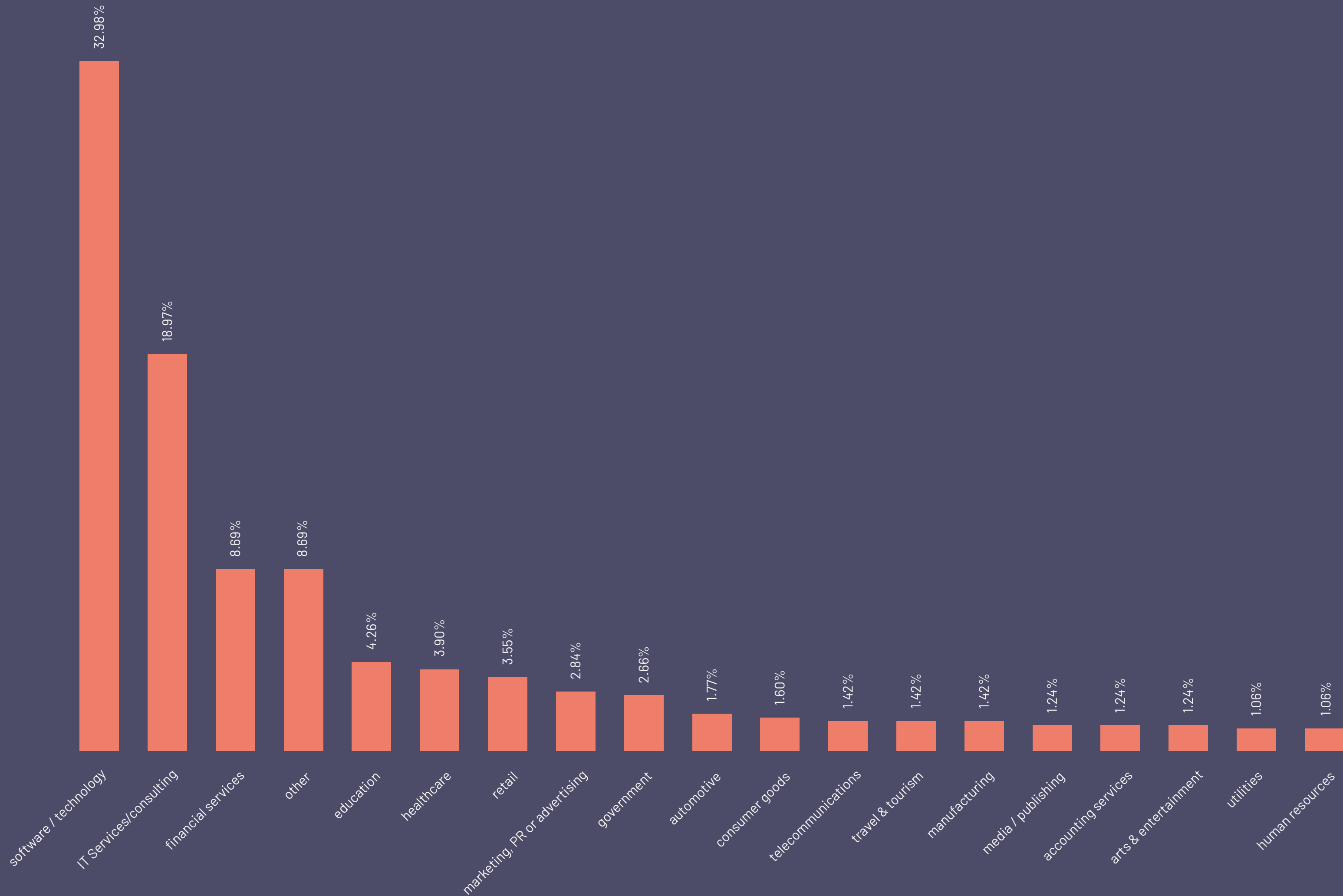
Central & South America

9.22%

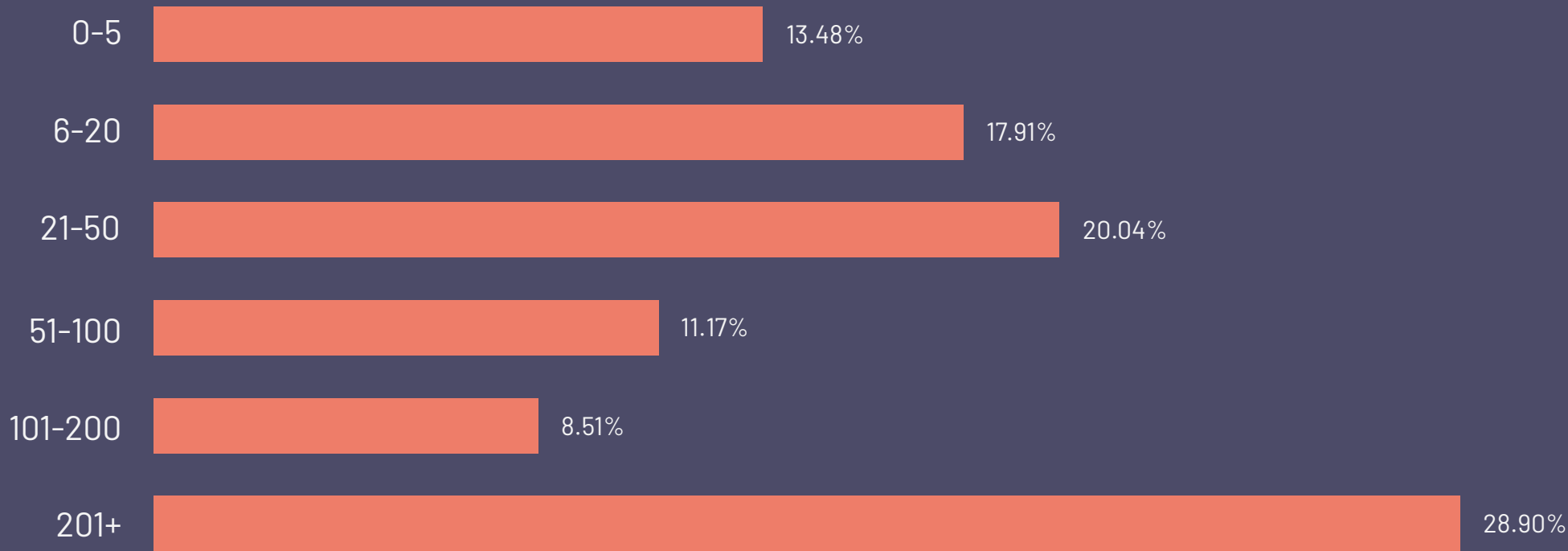
North America

34.75%

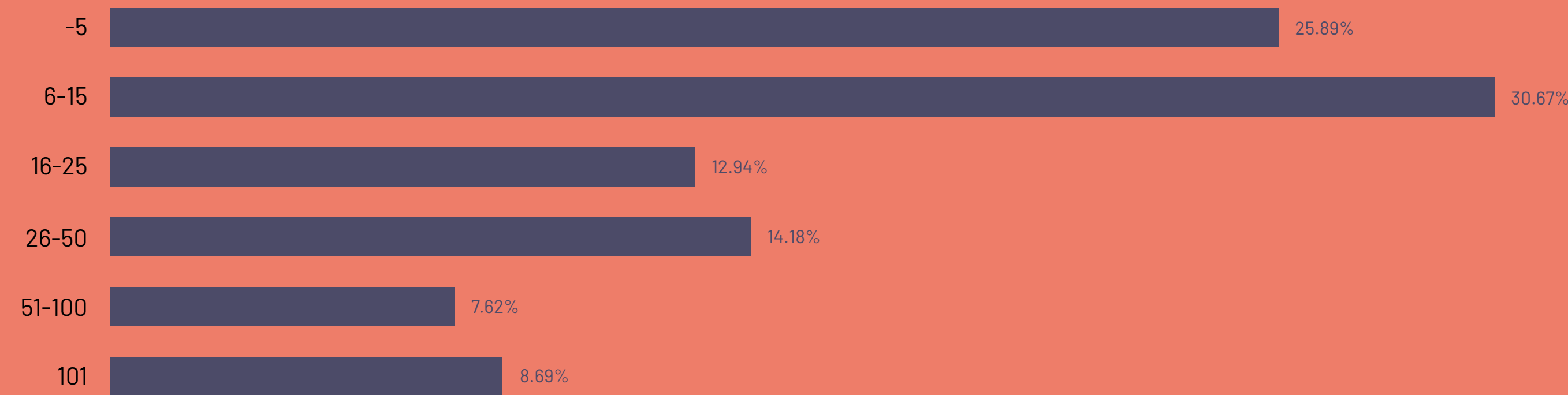
what industry are you in?



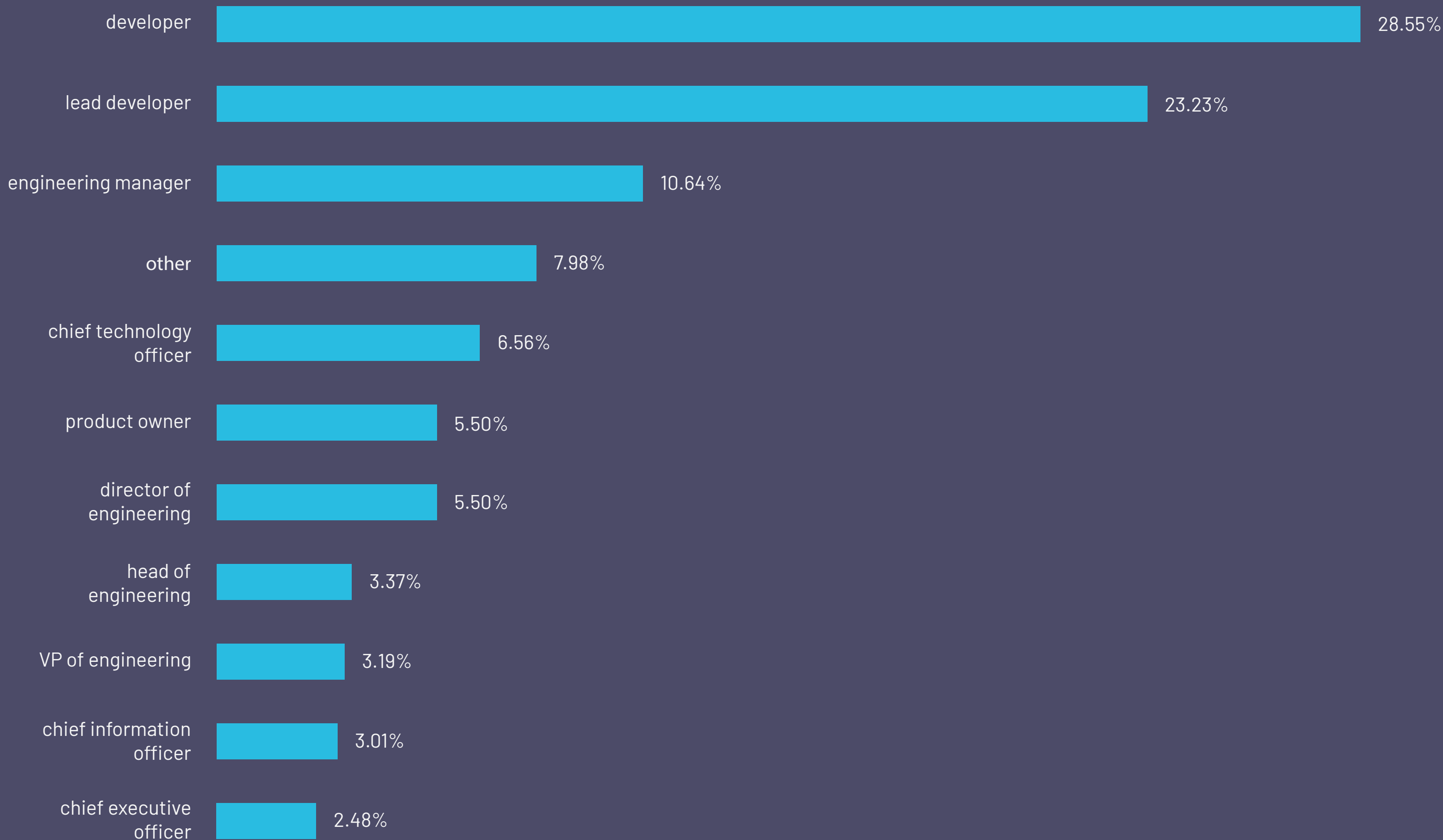
how many full-time employees does your company have?



how big is your software team?



what's your role in your company?





# bylines and methodologies

Coding Sans fielded an online survey in cooperation with 12 partner companies from February 2021 until April 1, 2021. The survey was available in English and consisted of 35 questions. The responses were sourced via email invitations, social media, and newsletter promotion with other companies. No personal information was collected within the survey. Tool discounts, and eGift cards were offered as incentives to increase survey participation and completion rate.



# nice to meet you

Coding Sans is a software development agency, building web applications from design to delivery with Node.js, React and Angular.

We're based in Hungary working for companies all around the world.

## Let's connect:

[Our Facebook page](#)

[Yes, Twitter](#)

[Our LinkedIn page](#)

Say hi here: [info@codingsans.com](mailto:info@codingsans.com)

Questions & feedback: [tamas@codingsans.com](mailto:tamas@codingsans.com)

Snail mail: 1051 Budapest, Arany János utca 10., Hungary

Website: [www.codingsans.com](http://www.codingsans.com)