State of DevOps Report 2022

Presented by  nagarro

Contents

Executive summary

After publishing our first State of DevOps Report in 2021, we realized we could have covered some areas in greater detail. With that learning in mind, we began working on the State of DevOps Report for 2022, based on our client landscape, providing even more insights into the current status-quo of DevOps adoption, and about what drives organizations to excel in software delivery.

Almost 50% of organizations can be classified as high or even elite performers, a significant 30% increase as compared to last year's results. Most (60%) organizations struggle to achieve a high deployment frequency, which costs them valuable time, flexibility and overall agility. It seems that our industry still has a lot of potential for improvement – especially in areas beyond applying technical practices.

We asked many leading domain experts and peers to share their experiences with us, which helped us gain some interesting insights.

Focus Areas of State of DevOps Report, 2022

The focus of this year's evaluation was mainly in the areas of:

- Culture & work environment
- Technical practices (development, deployment)
- Testing practices
- Team interaction & collaboration

In the first section, we will provide an overview of how we performed measurements and how we reached our findings.

The second section describes the four key findings and their relevance in the software delivery field, their respective importance, and potential future impact on your organization.

If you are interested in the tool landscape, just can visit the Appendix section, where we describe the different working environments.

We hope you will get some useful and relevant takeaways from our insights.

Key findings

1

Deliberate improvement over myopic measures.

Almost half of the respondents can be classified as high or elite performers, which poses the question – what is driving their performance and what is holding others back?

2

Remote collaboration is everywhere – so what?

Everyone is doing it, but doing it right is not trivial. How is remote collaboration impacting organizations?

3 Ways to overcome cloud adoption challenges.

While Cloud adoption has become a ubiquitous differentiator driving high performance, this trend poses significant challenges. This means that now, more than ever, organizations need to ensure spending is strategic and full potential is unlocked.

4 Feedback, the foundation for continuous improvement.

In order to become a high performer, fast feedback cycles are imperative. To achieve this, it is vitally important to ensure that both the organizational as well as technical principles are in place.

Introduction

DevOps has matured and arrived in almost all organizations across all industries. It continues to break down silos between development, operations, and other stakeholders.

However, with DevOps evolving and incorporating lean and agile principles with more sophisticated technical tools and practices, a chasm seems to be forming between organizations fully embracing this approach and the ones that struggle to keep up with the emerging changes.

It’s important to focus on both groups to ensure that we, as an industry, can continue to grow and evolve, without leaving anyone behind.

Stefan Gwihs,
Quality DevOps Practice Lead at Nagarro

“It’s difficult for anyone to argue that the continued adoption of DevOps principles and practices lead to improvements across organizations and industries. Countless teams and departments could not only increase their productivity, but also their motivation and overall well-being in doing so. Now it is also our responsibility to ensure that we can foster this culture and mindset throughout the industry so that we can all be more successful and happier."

Nagarro is a global digital engineering leader with a full-service offering. In 2022, we decided to update our report published in 2021 to share more findings that influence software delivery and organizational performance.

This report summarizes the key findings from our “Nagarro State of DevOps” survey, where we tried to get a holistic view on all topics that directly or indirectly impact the software delivery lifecycle of organizations throughout industries and geographies.

This DevOps survey (and the report interpreting its results) should help us understand how DevOps principles and practices can be applied in specific contexts and how outside factors can impact their effectiveness. This can drive business success for all.

- Our survey's questionnaire contained 55 multiple-choice and rating questions.
- This survey took approximately 15 minutes to be completed.
- The entire data is collected anonymously, voluntarily provided, email addresses are not linked, and every information is kept confidential.

Acknowledge-ments

The published report is not only driven by the survey results but is also influenced by our work with customers, across countless conversations with the DevOps experts, Agile experts, and the broader technical community. Many thanks to all our peers and colleagues, who so openly share their experiences, stories, success, challenges, and failures. Without those inputs, interpreting and condensing the survey into something meaningful would never have been possible.

The authors would like to thank several people for their input and guidance on the report this year. All acknowledgements are listed alphabetically by type of contribution.

We would like to thank **Gurpreet Bhadesh**, **Manisha Mittal**, **Nikhil Yadav**, and **Shailesh Dhaundiyal** for developing and optimizing the questions of this survey, which set the foundation of this report.

A special shoutout to **Elisabeth Schweighofer** and **Susanne Soumelidis** for the numerous reviews of the survey questions, mailings, and various other documents and, in general, their relentless support in marketing it – both internally and externally. Be it any area or domain related to the report, you always have good ideas on how we can make it even better.

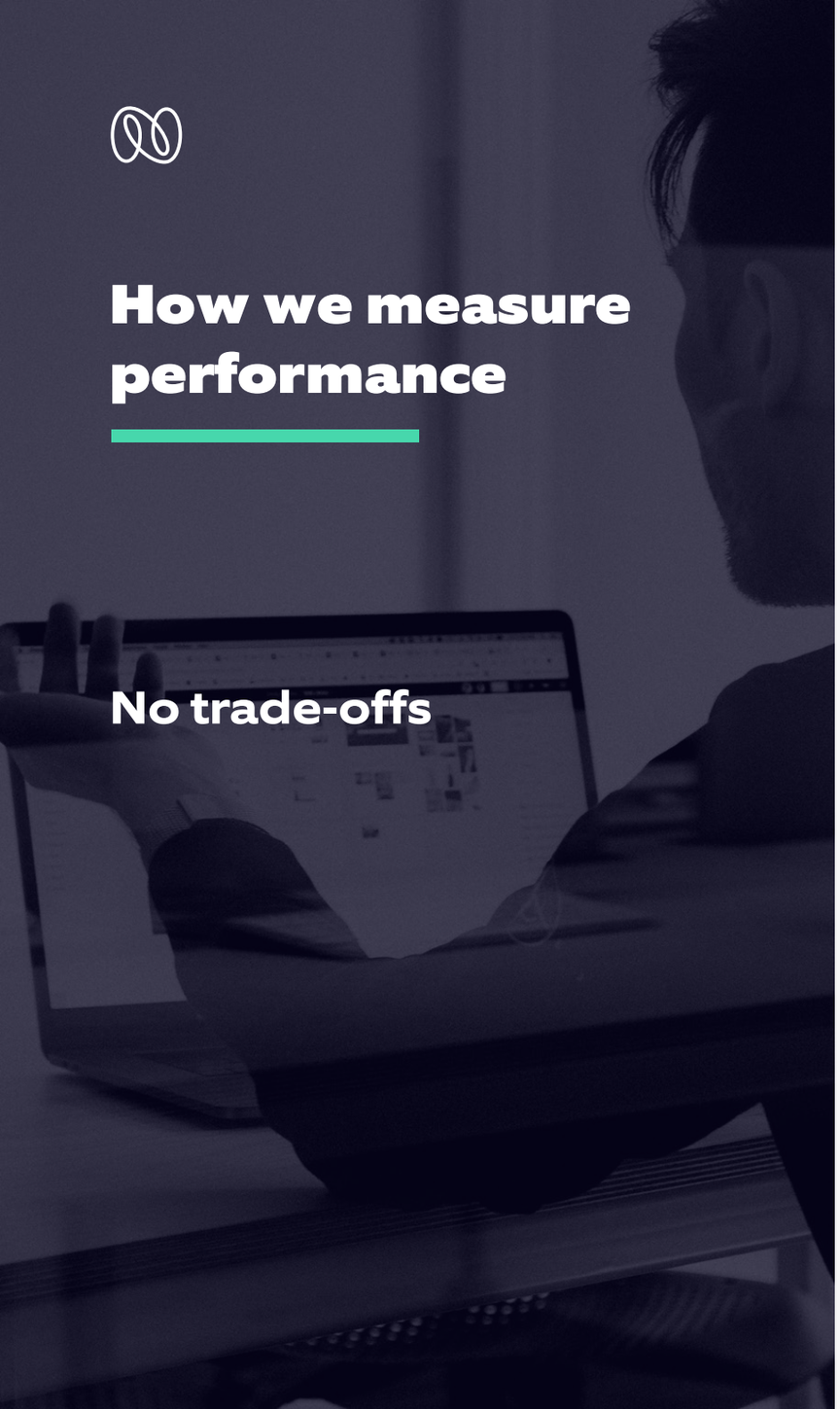
We would also like to thank the entire **Global Delivery Management** team who helped us bring the survey to our clients. They have promoted the survey tirelesslypromoting the survey and have provided a lot of valuable input.

Our work is not possible without the careful review of subject matter experts; for dedicating their precious time on supplementary topic review and inputs on measurement items, we are extremely grateful to them. Many thanks to **Alexander Birsak** and **Manisha Mittal**.

Thanks to **Benjamin Chemelski** for the graphical editing, and to **Shailesh Dhaundiyal** for the linguistic review.

A special thanks to the Nagarro DevOps CoE, and specifically Kailash Bisht, for our productive collaboration and continuous review; which made it possible to incorporate even more views on DevOps into this report.

Finally, we would like to thank all **participants** in this year's survey, who took the time to answer all our questions. Without you, this report would not exist. Thank you for your invaluable inputs.



How we measure performance

No trade-offs

Our measurement and clusters are an interpretation of DORA's published industry-standard key metrics[1].

To ensure consistency and to allow for direct comparison and benchmarking with similar reports, we decided to fully align options for answers and their interpretation to industry standards.

This means that the performance classifications published in this report are consistent with the results obtained by using the DORA DevOps Quick Check[2].

The industry-standard four key metrics for software development and delivery are driving organizational performance in technology transformations.

Software delivery performance (SDP) compromises speed and stability, and both are possible without trade-offs.

The improvement of the four key metrics is led by, among others, technical practices, cloud adoption and organizational practices. Each metric creates a virtuous circle and directs teams toward continuous improvement.

1 Using the four keys to measure your DevOps performance

2 DORA DevOps Quick Check

Measuring DevOps performance

High-performing teams create high-performing organizations.

Speed

- **Deployment frequency** – How often an organization successfully releases to production
- **Lead time for changes** – The amount of time it takes a commit to get into production

Stability

- **Change failure rate** – The percentage of deployments causing a failure in production
- **Time to restore service** – How long it takes an organization to recover from a failure in production

These four key metrics are a simple and yet powerful tool to help leaders and teams focus on measuring and improving what matters. A good place to start is to instrument the build pipelines so you can capture the four key metrics and make the software delivery value stream visible.

The DevOps performance clusters[1]

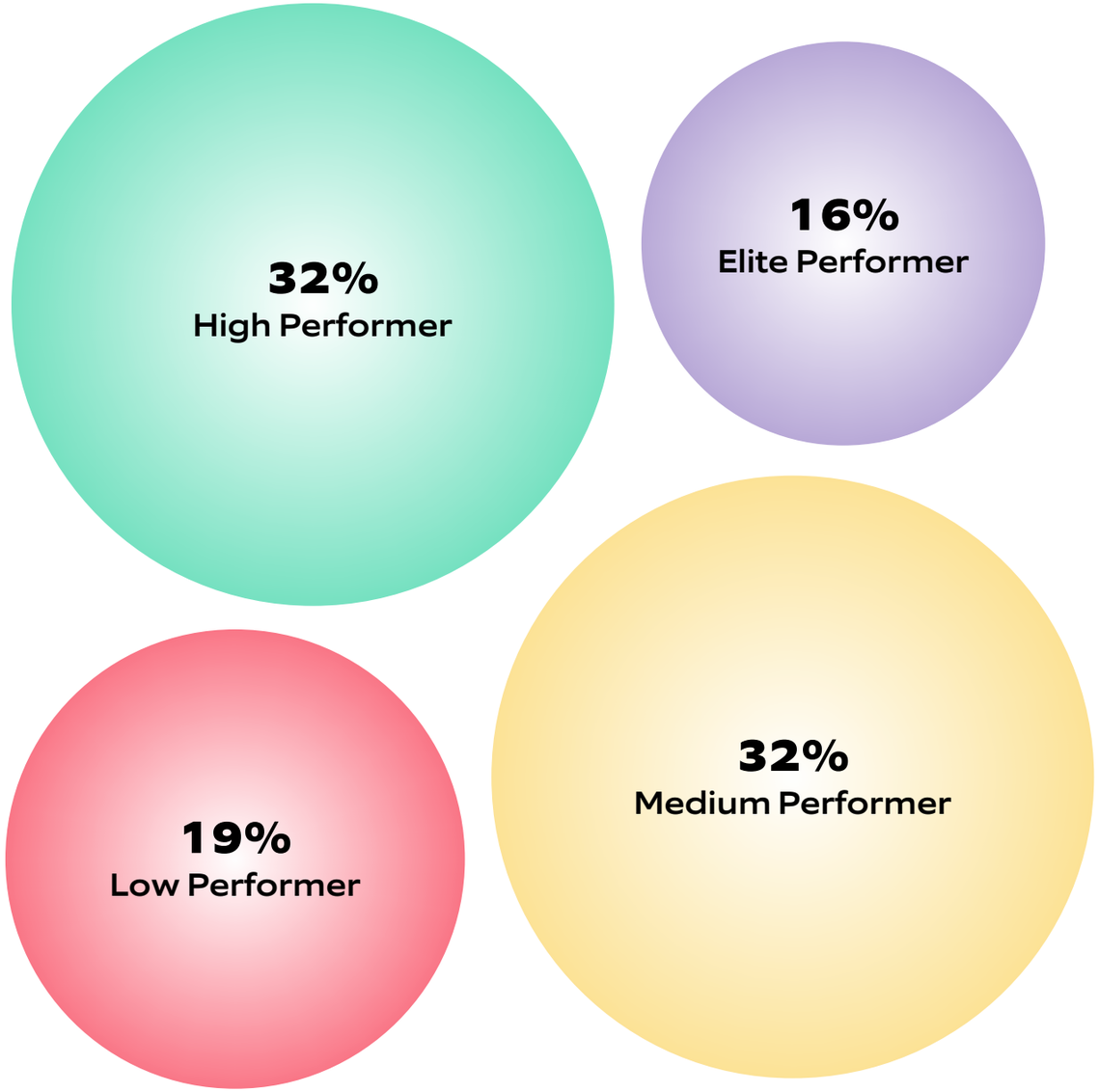
What performance profile fits you best?

Metric	Elite	High	Medium	Low
Deployment frequency	On-demand (multiple deploys per day)	Between once per day and once per week	Between once per week and once per month	Between once per month and once every six months
Lead time for changes	Less than one day	Between one day and one week	Between one week and one month	Between one month and six months
Time to restore service	Less than one hour	Less than one day	Less than one day	Between one week and one month
Change failure rate	0-15%	0-15%	0-15%	46-60%

1 Performance indications and clusters derive from the State of DevOps Report 2019 published by DORA.

The DevOps performance profile[1] distribution

High-performing teams are the primary means of delivering value.



1 Performance indications and clusters derive from the State of DevOps Report 2019 published by DORA.

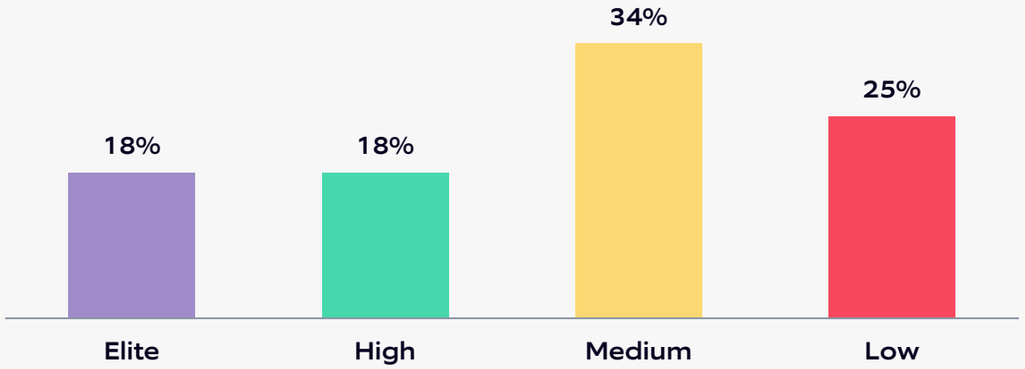
Speed

Deployment frequency

How often an organization successfully deploys changes to end-users

Deployment frequency is about how often a product can be deployed to end-users. It can indicate the speed and frequency of experimentation and how flexibly an organization can respond to changing market demands. To significantly improve deployment frequency, you must focus on team autonomy, architectural isolation of products and process automation throughout the delivery pipeline.

Almost 60% organizations are still struggling with relatively low deployment frequencies of below one week (25% even below one month). From experience, increasing the deployment frequency is often limited by organizational shortcomings (lack of autonomy, team interdependencies, long release cadences) and not by technical limitations. Hence, improvements are often long-term and difficult to initiate.

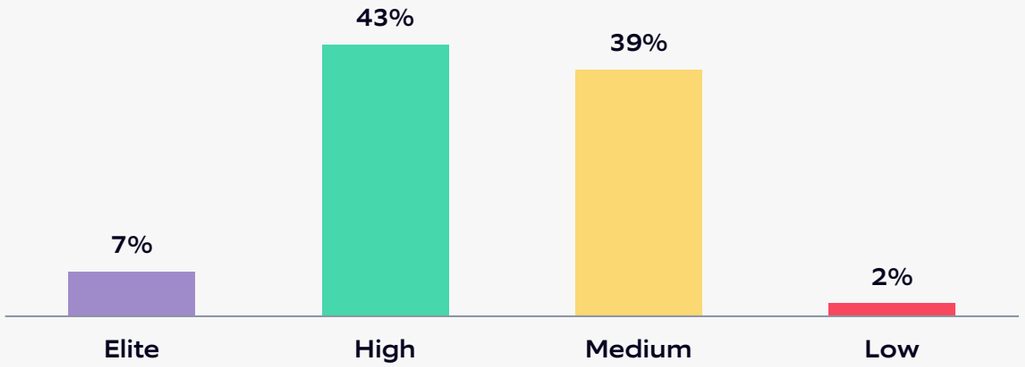


Lead time for change

The amount of time it takes a commit to run successfully in production

Similar to frequent deployments to end-users, a low lead time for changes increases the organization's responsiveness to changing market demands. This also reduces any risks associated with frequent deployments because an “inadequate change” can quickly be improved. Additionally, learnings from experiments with actual end-users can be incorporated quickly, into product features. In this way, a low lead time for changes is, to a certain degree, a pre-requisite for continuous value delivery.

50% of respondents already work with lead times of below one week. 39% have lead times between one week and one month – which, from our experience, is still an acceptable timeframe for many organizations and in some situations, might not warrant significant improvements.



Stability

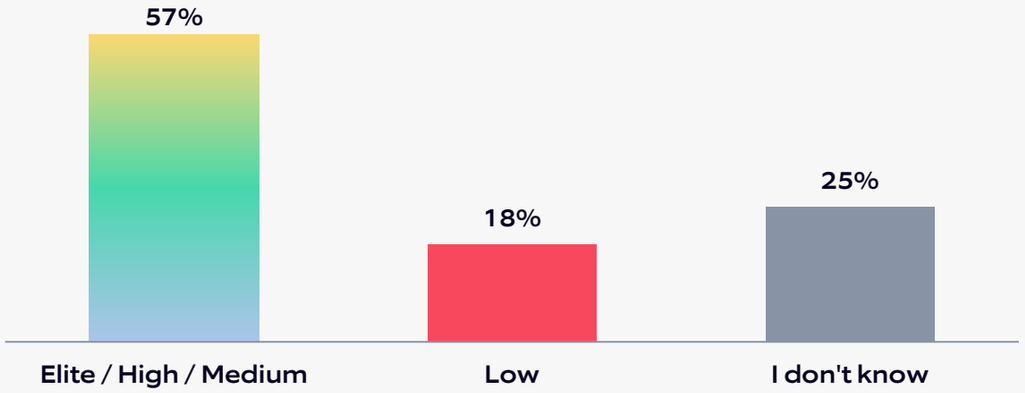
Change fail rate (CFR)

The percentage of deployments causing a failure in production

Since the CFR is not, in itself, indicative of a specific performance cluster, we decided to distinguish only between the “below 15%” and “higher than 15%” clusters here.

The CFR shows how often software deployments cause a failure in production that must be remedied (e.g., hotfix, fix-forward). This can highlight insufficient quality assurance measures, issues within the release pipeline (e.g., manual activities) or inadequate team structures (e.g., multiple handovers before go-live).

It was interesting to see that a relatively low CFR (≤ 15%) is very common (> 50%). However, it was concerning to see that a quarter of the respondents did not know their CFR (as compared to <5% for other key metrics).



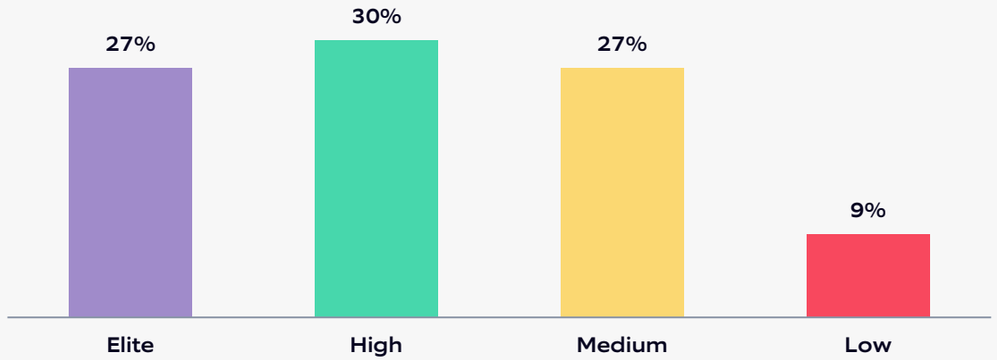
Time to restore a service (MTTR)

How long it takes for an organization to recover from a failure in production

The time it takes an organization to recover from a failure is a good indicator of the maturity of the organization's delivery pipeline. To recover from a failure in production, many different practices must work together, efficiently and effectively. It can be improved primarily through automation, holistic monitoring and effective collaboration.

Almost 60% of the responses show that this is an area where organizations seem to have well-established principles and practices in place. Those 60% can restore normal operations within less than a day.

Despite this, there is still significant room for overall improvement, as 36% take more than a day to restore services, and almost 10% have an MTTR of more than a week.



Deliberate improvement over myopic measures

1

Consistent to findings published by Google Cloud[1], elite performers keep raising the bar for software delivery excellence.

As more and more teams can be classified as high or elite performers, more context-specific advice is required. Further improvements rely more heavily on contextually-relevant emergent practices that need to be adopted or experimented with.

1 Accelerate State of DevOps 2021 – Google Cloud

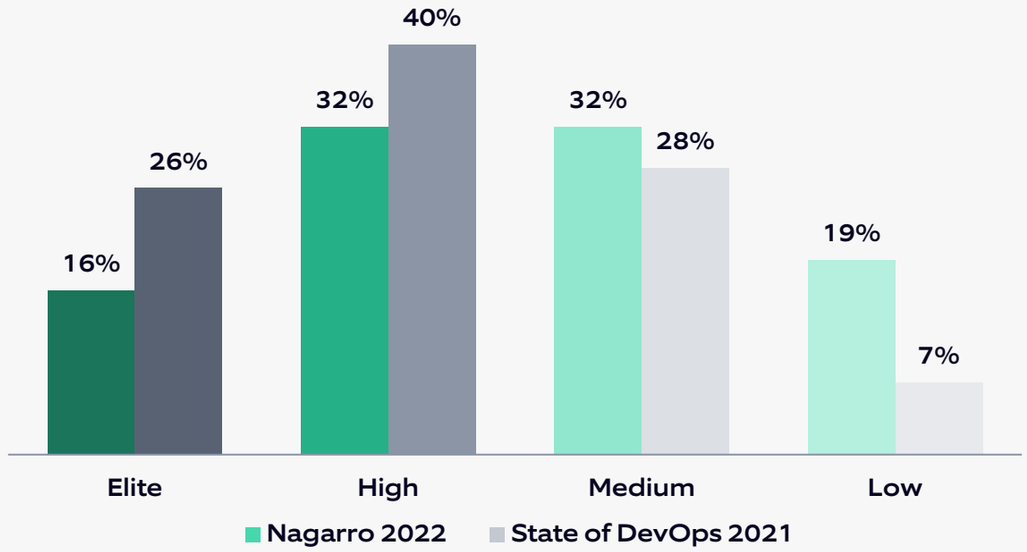
Teams are delivering value – reliably

Comparing performance profiles

Almost 50% are high or even elite performing teams

The fact that 37% of teams are deploying at least once per week while keeping a relatively low CFR (<15%) suggests that these teams must have the necessary practices in place to support this amount of throughput. This helps them deliver value, reliably and quickly.

Compared to the broader industry studies, there is still some “catching-up” to do. High and elite performers are still under-represented by 18% while medium and low performers are over-represented by 16% in this year's survey results.

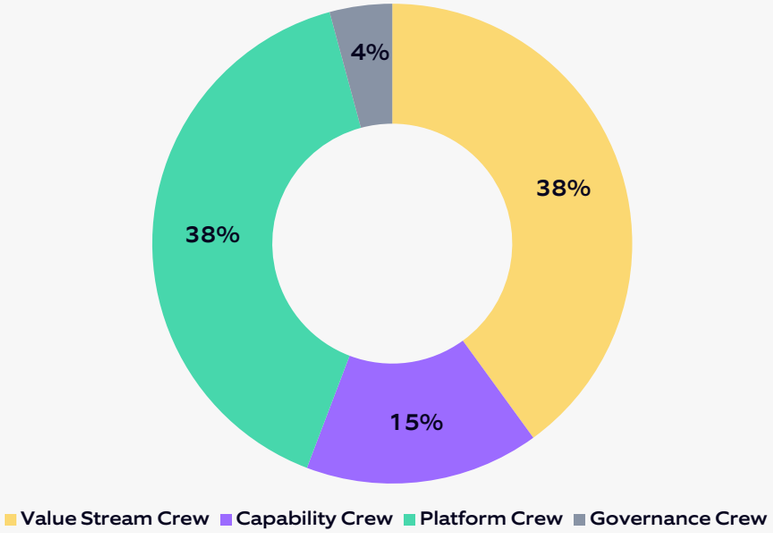


Common team topologies supporting value delivery

Deficient team interactions constrain improvements from technical practices

Widespread adoption of many technical practices (as presented later) indicates that differences in performance are likely more related to the interaction modes between teams.

Mapping the responses to common crew types[1] shows that 76% of them can be classified as either “Value Stream Crews” or “Platform Crews”. Both those types require a high maturity in technical practices to sustainably deliver value. It is very difficult to get further insights into interaction modes[2] on a generic level. They should be investigated specifically for an organization.



1 adopted from unFIX Crew Types
2 referencing Team Topologies Team Interaction Modes

Technical capabilities supporting SDP[1]

Widespread consensus among respondents

Most organizations and teams agree on technical practices to leverage. Continuous Delivery is adopted widely.

The responses show consistently that organizations are adopting those technical practices which have been shown to directly impact the software delivery performance (SDP). There is no significant disagreement that these practices are helpful and valuable.

There are only two notable exceptions: “Trunk-based development” (TBD) and “A loosely coupled architecture”. Given that TBD is not applicable for some organizations, team topologies or application architectures, a relatively neutral degree of agreement is quite reasonable.

Technical capability supporting SDP	Degree of agreement[2]
Test automation	3,7
Deployment automation	3,7
Trunk-based development	2,7
A loosely coupled architecture	3,1
Empowering teams to choose tools	3,9
Continuous integration	3,7
Continuous testing	3,5
Version control	4,2
Test data management	3,6
Comprehensive monitoring & observability	3,8
Proactive notifications	4,0
Database change management	3,7
Code maintainability	3,7

1 Software Delivery Performance
2 ranging from “strongly disagree“ (1) to “strongly agree“ (5)

Deliberate improvements support high organizational performance

It is being universally accepted that Continuous Delivery and its associated technical practices are crucial for high-performing Delivery teams. If that is truly the case, what causes the evident gap in overall software delivery performance of many organizations? (as shown in 2022, almost 20% of them can still be classified as “low performers”).

The response and past experiences indicate that while focusing on intra-team practices (like CI / CD) is a valuable and crucial foundation, their potential is limited if we do not leverage the benefits of inter-team collaboration.

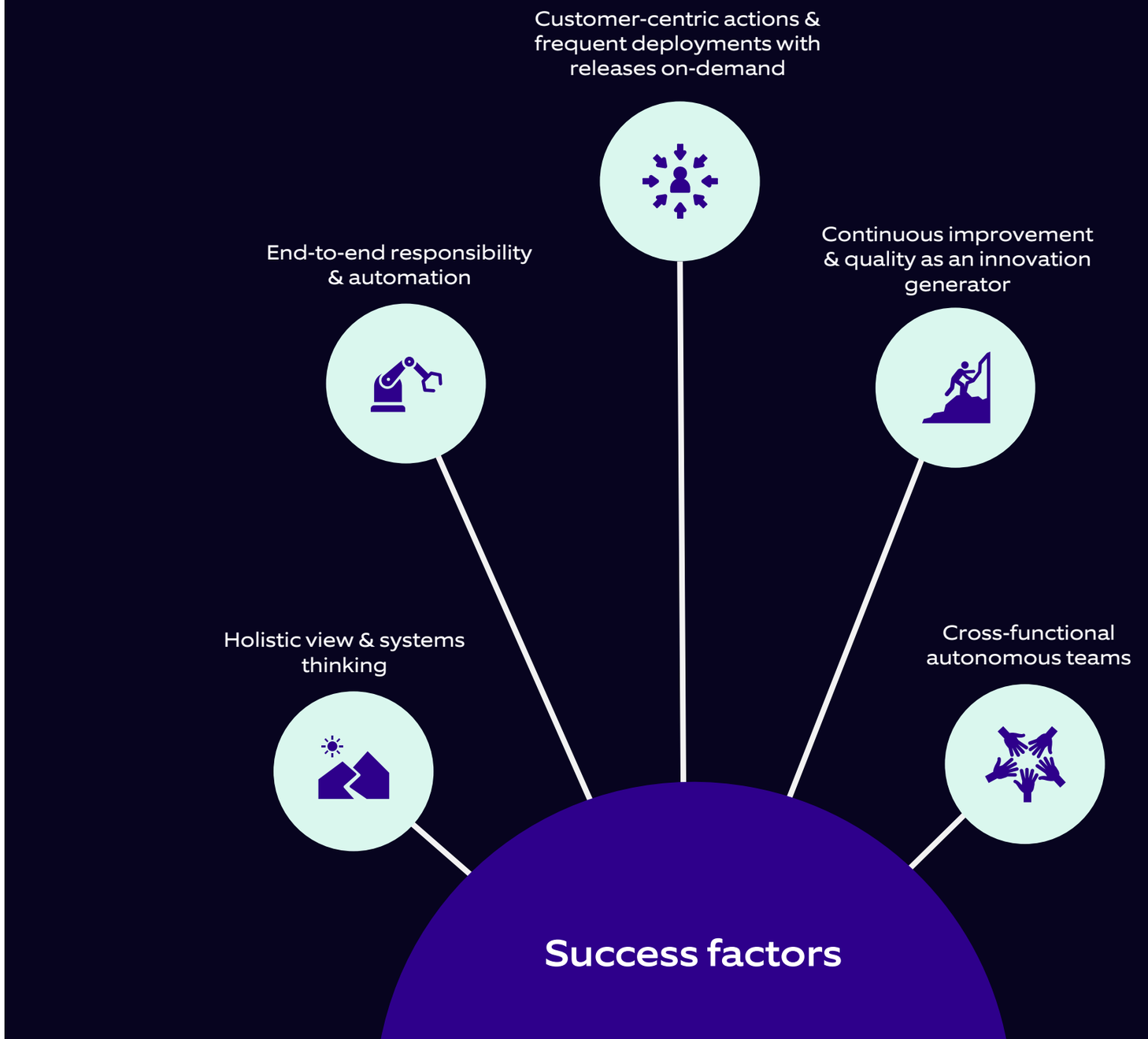
But doing all this in a systematic way, while experimenting and validating changes in how teams interact, is quite difficult. Which is why, it is often disregarded as teams prefer to work on more tangible, often technical, topics.

We still maintain that the mantra of continuous improvement will always remain applicable and helpful:

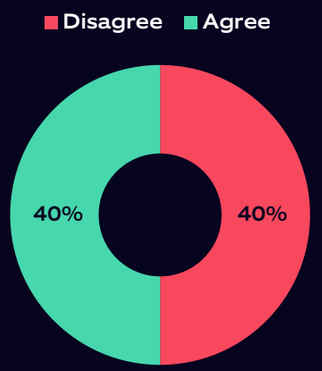
Start with the basics, then adopt a continuous improvement mindset by identifying your unique constraints (or set of constraints).

Nevertheless, a growing number of teams and organizations seem to primarily focus that on technical aspects with that mindset. Thus, they cannot fully utilize the potential of those practices.

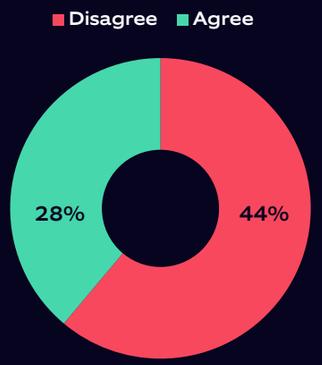
Tried and tested success factors that impact organizational performance



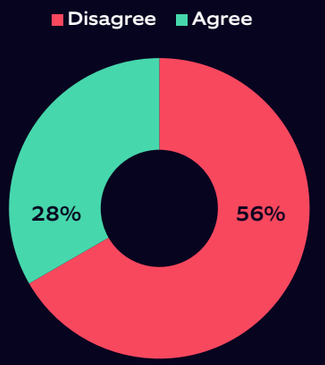
Team autonomy leading to continuous flow



To complete my own work, I don't need to communicate and coordinate with people outside my team.



My team can deploy and release our product or service on demand, independently of other services it depends upon.



We can make large-scale changes to the design of our system without the permission or dependent on others to make changes in their system.

When inquiring teams about how they are collaborating and what types of dependencies they have to consider; it becomes clear that many are not as autonomous as they could be. For example, only 28% of respondents can independently deploy and release their product, without considering dependencies on other services. 56% of teams cannot make large-scale changes to the design of their system without permissions or dependencies on others.

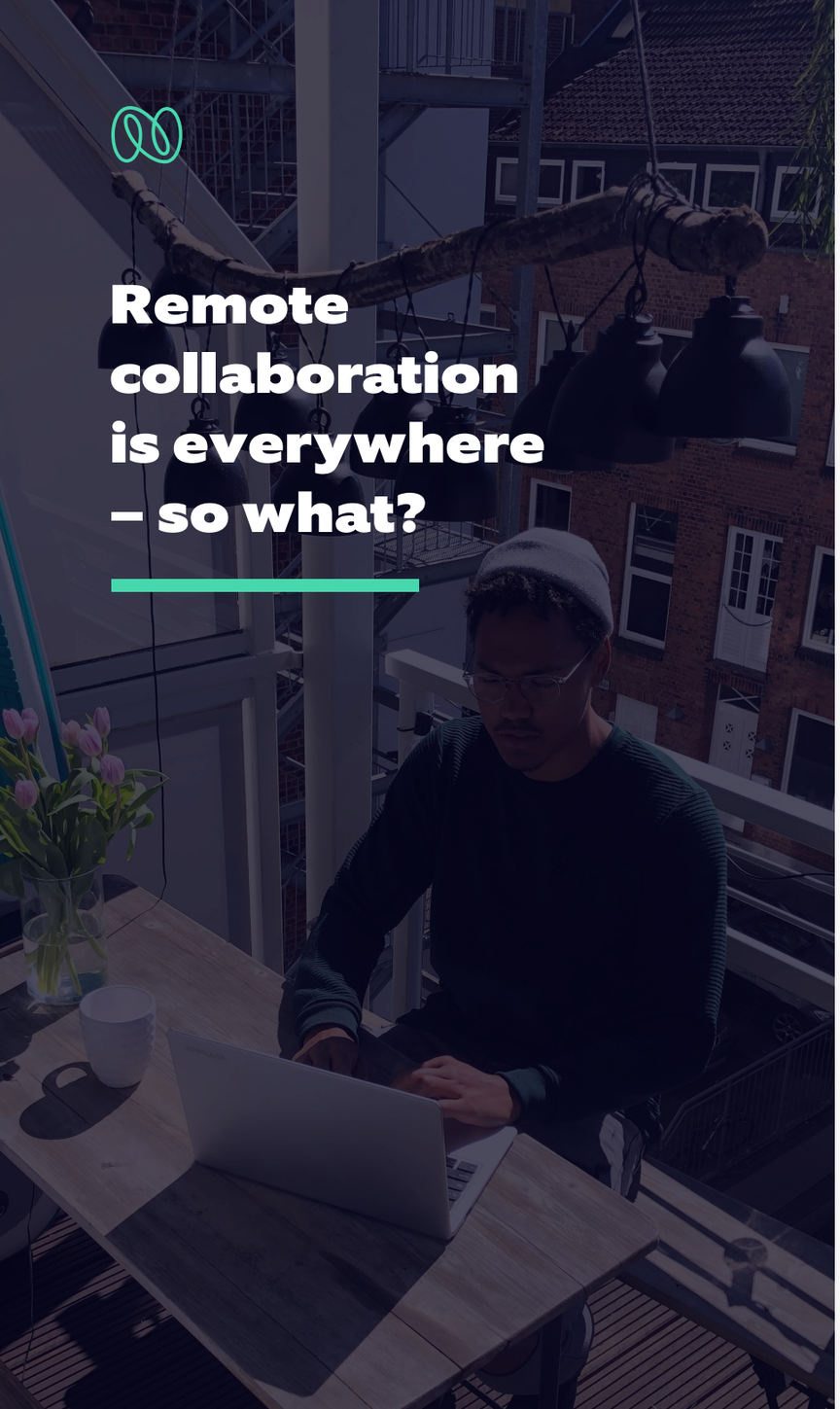
Systematic modelling of software delivery organizations and collaboration modes

However, simply observing this type of quantitative assessment won't allow for any qualitative inferences about how those interdependencies are supporting or hindering the flow of value. Systematic experiments, continuous & deliberate improvements require a more formal way of describing and reasoning related to organizational design. This enables organizations to compare and contrast their structures with industry best practices while clearly identifying potential inefficiencies and value flow bottlenecks.

It is important that these models are not prescribing a certain design (e.g., SAFe, LeSS or similar) but are primarily descriptive and encourage working on evolutionary structures instead of arriving at a final structure.

Depending on the aspect that should be improved, various models can be helpful:

- DevOps Topologies: to model and compare how software delivery capabilities can be distributed within and between teams
- Team Topologies: primarily describing team interaction modes and team purpose
- unfix: a holistic approach to model complex, software delivery organizations



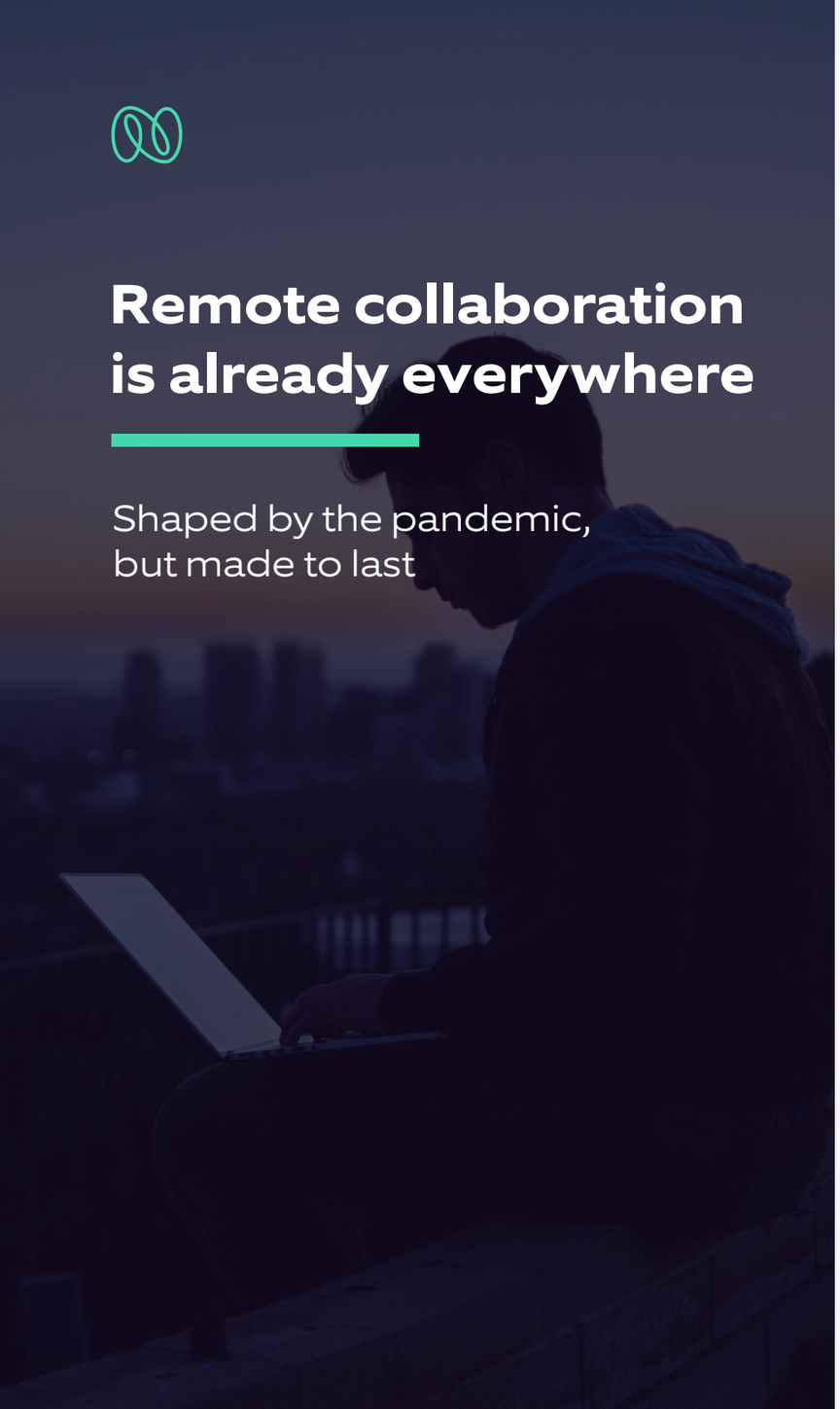
Remote collaboration is everywhere – so what?

2

Almost all teams (over 90%), are currently collaborating remotely on a daily basis. More and more tools are available to make this type of work more effective and efficient.

However, for a significant number of organizations, remote collaboration has negatively impacted their performance. In fact, there are even more organizations who feel remote work has deteriorated the physical or mental well-being of their employees.

This poses the question of what organizations can do to mitigate the negative impact by improving team structures and collaboration modes.

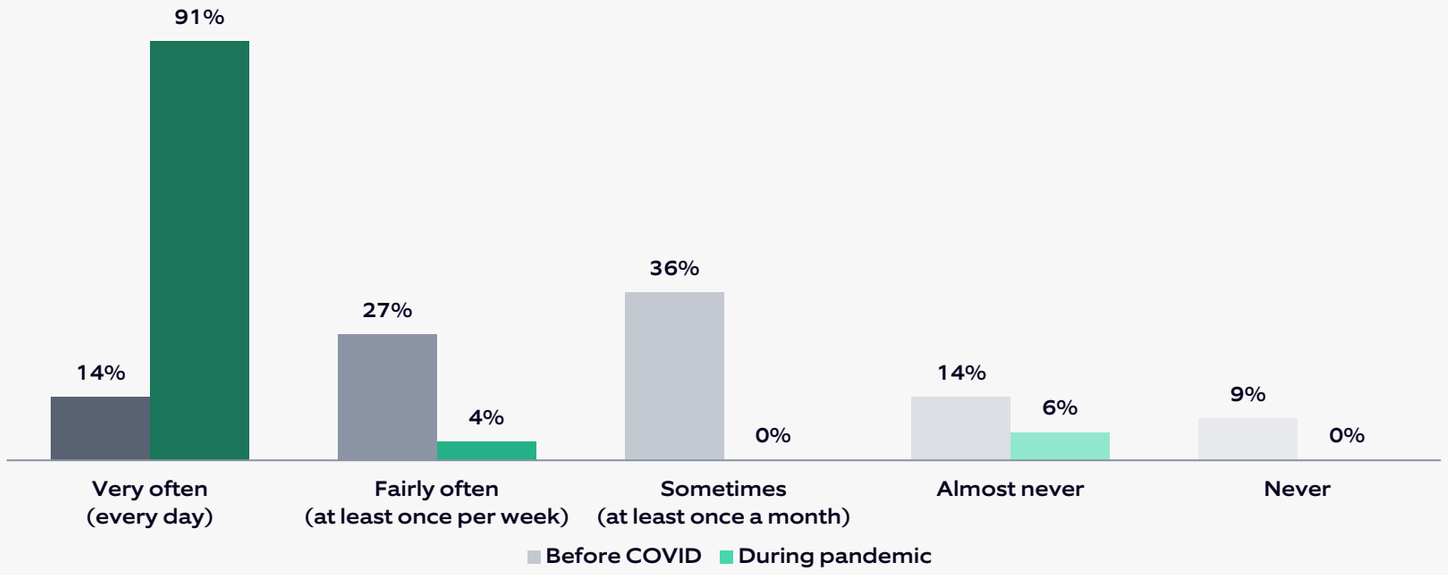


Remote collaboration is already everywhere

Shaped by the pandemic, but made to last

It is no surprise the industry's way of collaboration has changed drastically over the past 3 years. The pandemic forced organizations to change how their employees interact, practically “overnight”. Now, in 2022, more than 90% rely on regular (at least every day) remote collaboration and no organization can function completely without it.

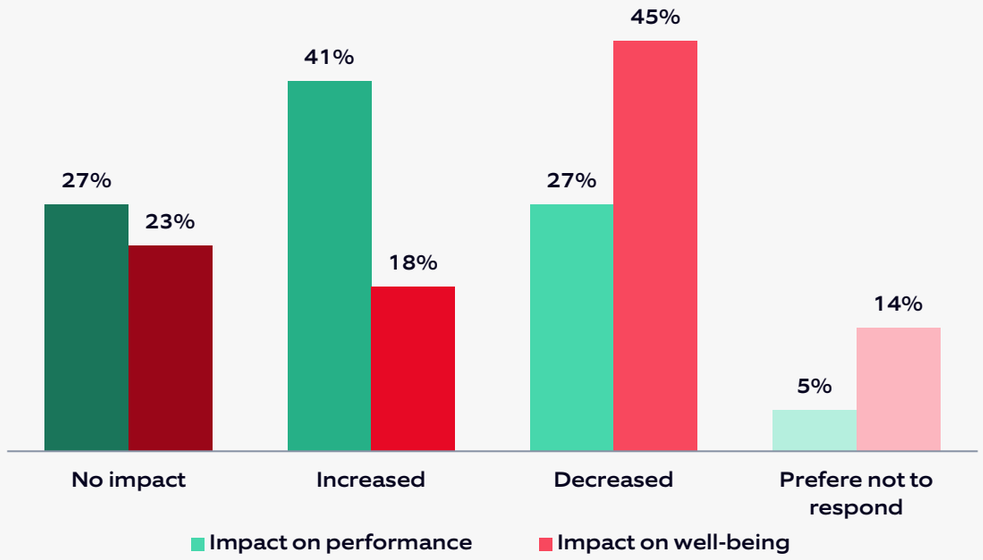
To think that this significant change was seamless and unproblematic for every organization would minimize the very real struggles many people were forced to face through these years. However, despite considering all the hardships, the continued adoption of remote and hybrid working models is here to stay and will continue.

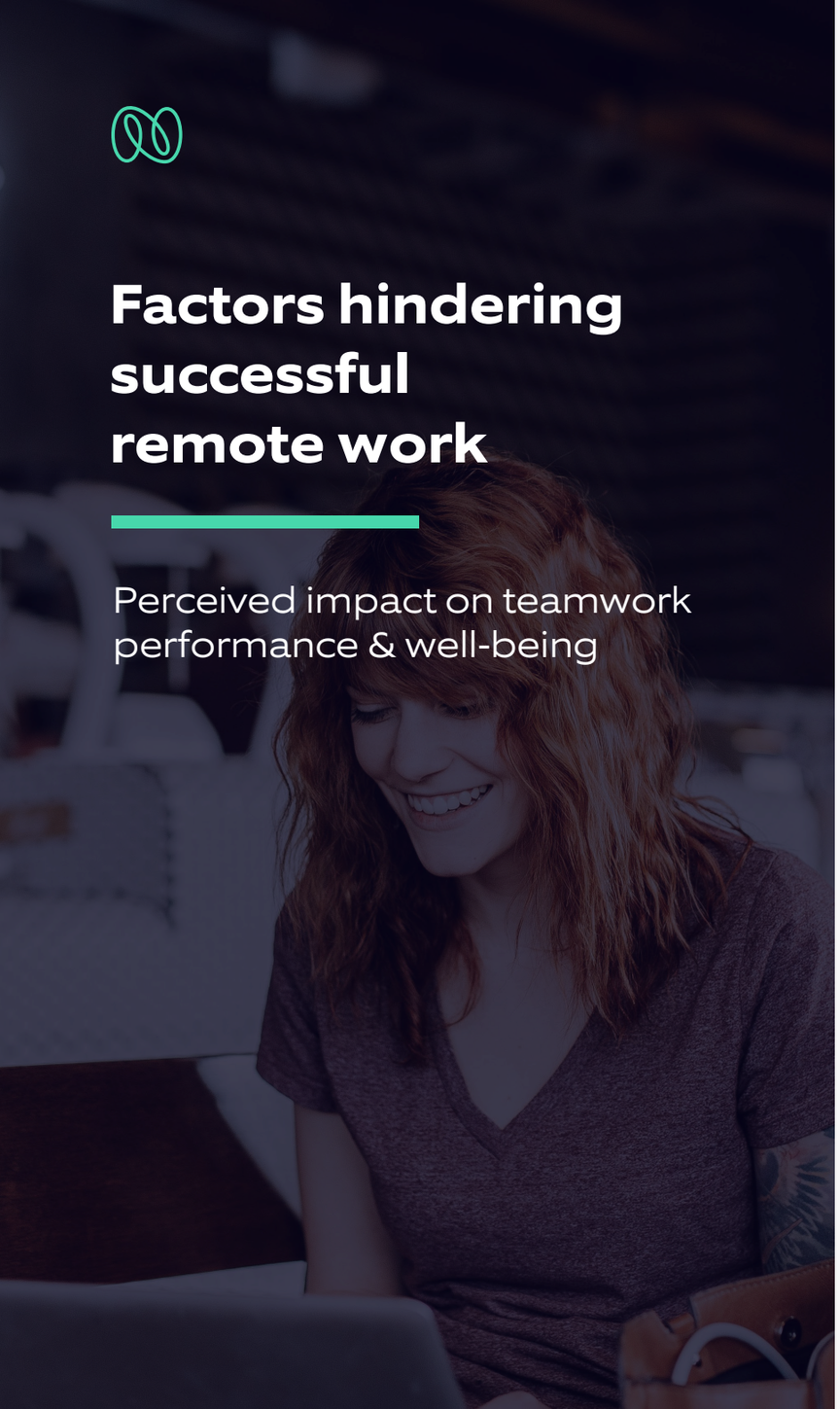


Quality of work in a remote setup

Perceived impact on teamwork performance & well-being

Given the difficulties many organizations initially faced when having to switch to a more remote-first way of working, it is reassuring to see that most seem to have overcome the biggest challenges. After an initial performance impact, most respondents (68%) either don't perceive an impact on the work performance or could even observe an increased performance (14% of the overall respondents even observe it to "drastically increase"). Nevertheless, in 27% of the cases, the performance did decrease, at least slightly.





Factors hindering successful remote work

Perceived impact on teamwork performance & well-being

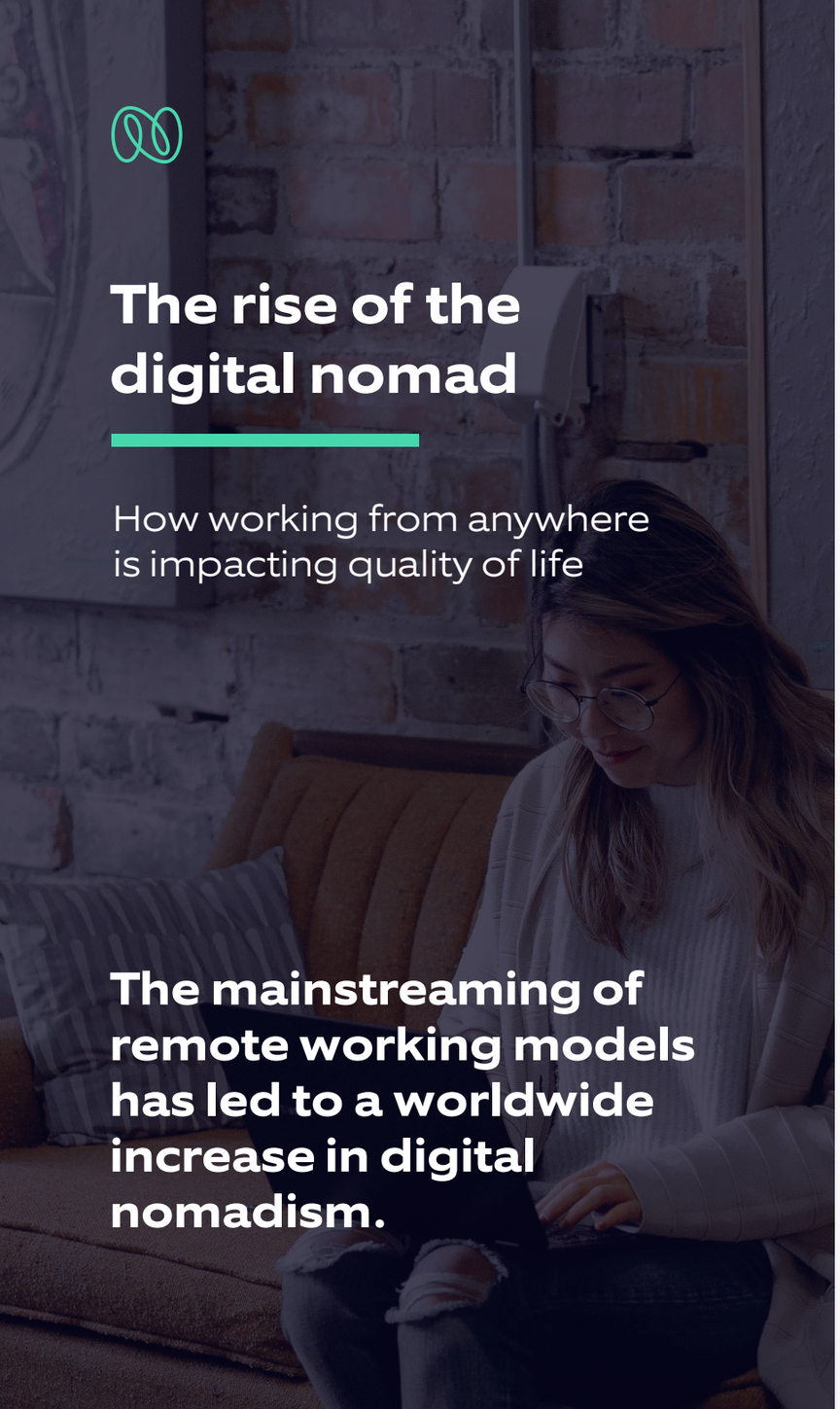
From our experience within Nagarro as a work-from-anywhere company, and from insights provided by many impacted clients, this can have various reasons:

- Ineffective structures imposing too many, unnecessary dependencies on teams
- Insufficient tools, self-service platforms, technology support
- Strong hierarchies, making decision processes tedious
- A culture not valuing diverse perspectives and insights

It must be noted that all the benefits associated with remote collaboration and working-from-anywhere, don't come "for free" by simply adopting remote collaboration tools & technologies.

It requires deliberate organizational (re-)design and continued evaluation of team interactions, in order to sustainably adopt this type of collaboration.

Even if most organizations don't observe a work-related performance impact, it is shocking to see that for 45% of the respondents, their team's well-being (e.g., physical health, mental health) was decreased. This means that switching to remote-first collaboration without taking the well-being of employees into account can be a dangerous, non-sustainable path.



The rise of the digital nomad

How working from anywhere is impacting quality of life

The mainstreaming of remote working models has led to a worldwide increase in digital nomadism.

Considering information provided by the survey’s respondents, it is clear that remote work

- is ubiquitous
- will impact the organization's work-related performance (for better or worse)
- will influence the individual's well-being (for better or worse)

Organizations must consciously work on ways to facilitate this new mode of collaboration. We have enough good examples from our industry which show that it is possible. In fact, when done correctly, such collaboration will have a positive impact on work-related performance and the individual's well-being.

Nagarro’s own record with working-from-anywhere shows that this change needs time and continuous focus. The right technical foundations must be established (self-service, high-quality collaboration tooling, digitalization of processes) and the organization's design should be improved (team autonomy, focus on diversity, culture work, facilitate important socializing opportunities).

In short, “make distance irrelevant between intelligent people”. It's no coincidence, that this also happens to be our mission statement at Nagarro.

Ways to Overcome Cloud Adoption Challenges

3

The massive, pandemic-driven shift to remote work has expedited the evolution toward cloud-first IT infrastructure.

With 59% of organizations having accelerated their cloud migration over the past 12 months, and companies with most or all IT infrastructure on the cloud expected to leap from 21% today to 63% in the next 18 months, it should be no surprise that this transformation is not coming without its share of challenges.

We have combined our findings with other reports to establish the main challenges & roadblocks that organizations are currently facing and identify the governance model that can support in this transformation journey.

Top Challenges – Security, Expertise and Spending

Cloud adoption comes with many benefits, but also new challenges.

The extensive adoption of cloud, evident in the number of organizations moving away from the traditional IT architecture, offers many benefits. At the same time, it also increases security threats.

When it comes to the top cloud challenges[1], it's a close race for most organizations. As the image below illustrates, the top three are security, lack of resources/expertise, and managing cloud spend.

Security was the number one challenge, and more emphasis is being placed on this with the rise in cybersecurity attacks. Within security, there are numerous challenges such as Denial-of-Service attacks, data breaches or data loss, and insecure access control points (endpoints and APIs). The challenge is further accentuated by the lack of IT expertise, potential misconfigurations, and the lack of cloud security strategy.

At Nagarro, we believe cloud security challenges typically arise from the 'lift and shift' approach used when moving from on-premise to the cloud. We believe it is vital to develop a cloud security strategy so that new approaches to security are considered and generated.

1 Flexera 2022 State of the Cloud Report

Cloud adoption is challenging, and organizations must be ready

Findings indicate that containers and virtual machines are the two most popular places to deploy applications and services. Despite considering the large push towards cloud adoption, nearly 20% (compared to 25% in 2021) of organizations are still relying on bare-metal infrastructure for handling their workloads.

Moving all this workload to the cloud can seem daunting as a lot of change is involved and many organizations struggle to find a good starting point. To help you in this journey while addressing the most common challenges (security, lack of resources / expertise and managing cloud spent), we suggest the following:

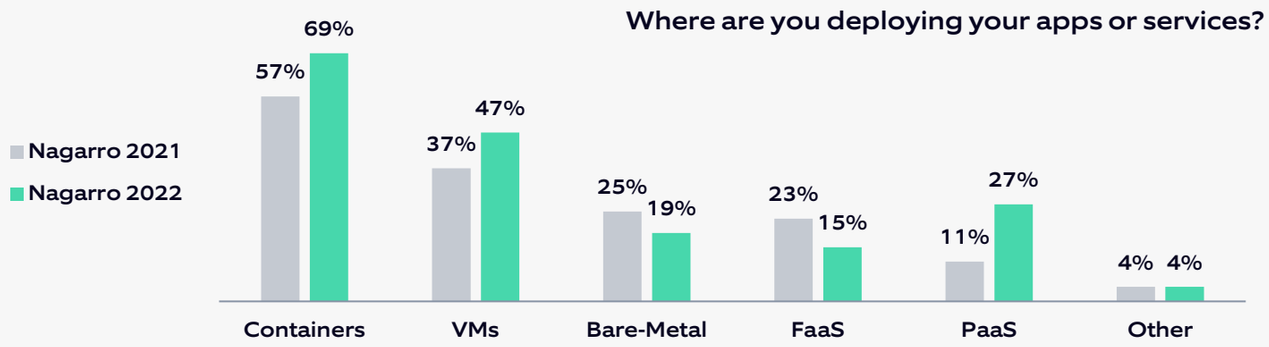
- Apply a phased approach to cloud adoption.
- Develop a Cloud Center of Excellence (CCoE) for sustainable and efficient adoption.
- Utilize FinOps principles and practices to effectively manage cloud operation expenses.

A Phased Approach to Cloud Adoption

Big-bang adoptions often lead to big issues.

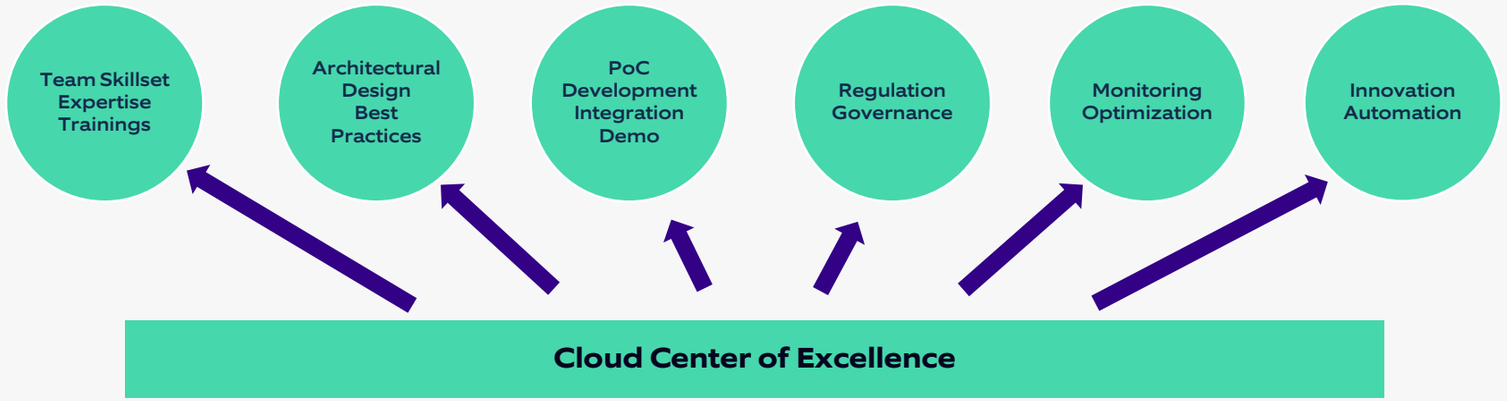
Instead of a big-bang cloud adoption randomly focusing on various systems, it is better to follow a phased approach where the business prioritizes the systems or applications to be moved to the cloud. This will provide a deeper learning curve and will allow the business to learn from any mistakes and adapt accordingly. This approach also provides flexibility for organizations that want to embrace either a multi-cloud or hybrid cloud model. With a multi-cloud approach, multiple cloud providers can be selected as per best pricing, service offerings or security considerations. In contrast, a hybrid approach allows a company to change direction quickly if required. This allows the business to make the move to cloud at its own pace and ensures that policies are implemented correctly.

A high level of containerization helps organizations to be prepared, with better transition to the cloud. Containers are portable and can be run uniformly and consistently in the cloud while providing additional levels of security through process isolation. The fact that almost 70% of the survey respondents already use containers to deploy their workload (compared to 56% in 2021), supports them in making the phased approach to cloud adoption even more smooth.



Develop a Cloud Center of Excellence (CCoE)

Sharing is caring.
Start building cloud expertise within the organization.



A Cloud Center of Excellence (CCoE) consists of cross-functional stakeholders from IT and finance teams, operational leaders, and cloud security managers within the company. At Nagarro, we recommend that all business product owners should also be part of the Cloud CoE to ensure regular communication and better insights from developers as part of an engagement.

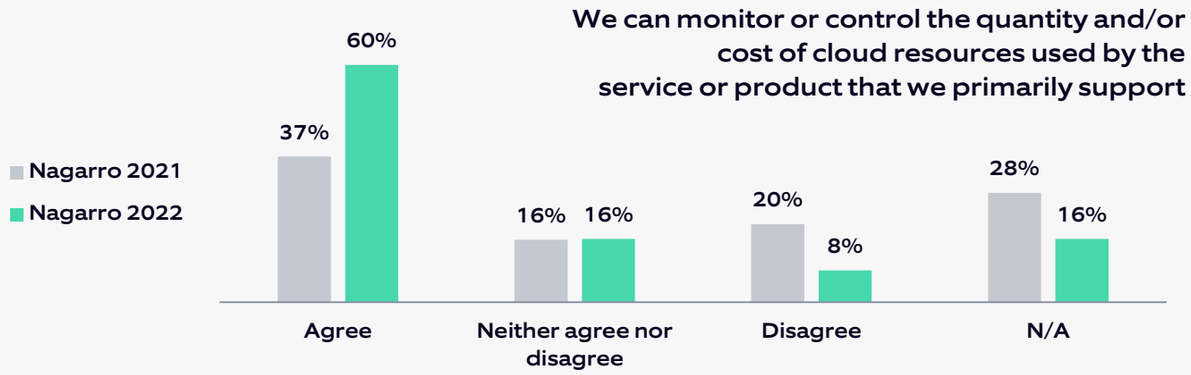
A Cloud CoE is responsible for researching cloud options, choosing the correct model, implementing solutions and managing ongoing costs, as well as setting the budgets for departments and teams. The creation of such teams also identifies the current skillset within the organization and enables it to better address whether additional capabilities and skillsets are required. The members of the CCoE can also train other staff members, ensuring that knowledge is retained at all times.

FinOps to streamline cloud operations

With the evolution of cloud, FinOps is gaining popularity and is changing the market standards by controlling costs with any of the cloud providers. With most of the organizations already being on their cloud journey where they are either restructuring or refactoring their applications to move workloads/services onto cloud, it is imperative to monitor costs closely with this transformation journey. This is where FinOps can play a key role.

The image below illustrates how confident respondents felt about monitoring and controlling costs within the cloud. Though it demonstrates a slight improvement from 2021, it also implies that there are gaps and organizations should keep focusing even more on long-term aspects such as optimizing and managing costs in the cloud. While it may not be to the same degree as observed by the Flexera 2022 State of the Cloud Report, it is still needs considerable attention.

FinOps can help organizations achieve that.



FinOps to Manage Cloud Operation Expenses

FinOps is rapidly becoming an industry-wide practice, assisting organizations in deriving the maximum value out of their cloud investments. FinOps can accelerate company growth, gain strategic competitive advantage, improve operational resilience as well as deliver innovative, market-leading solutions cost-effectively – and optimizing cloud bills all this while!

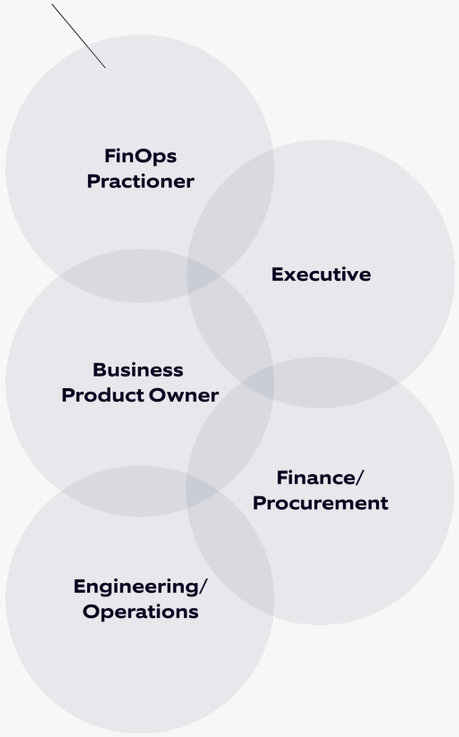
The key principles at the foundation of FinOps are:

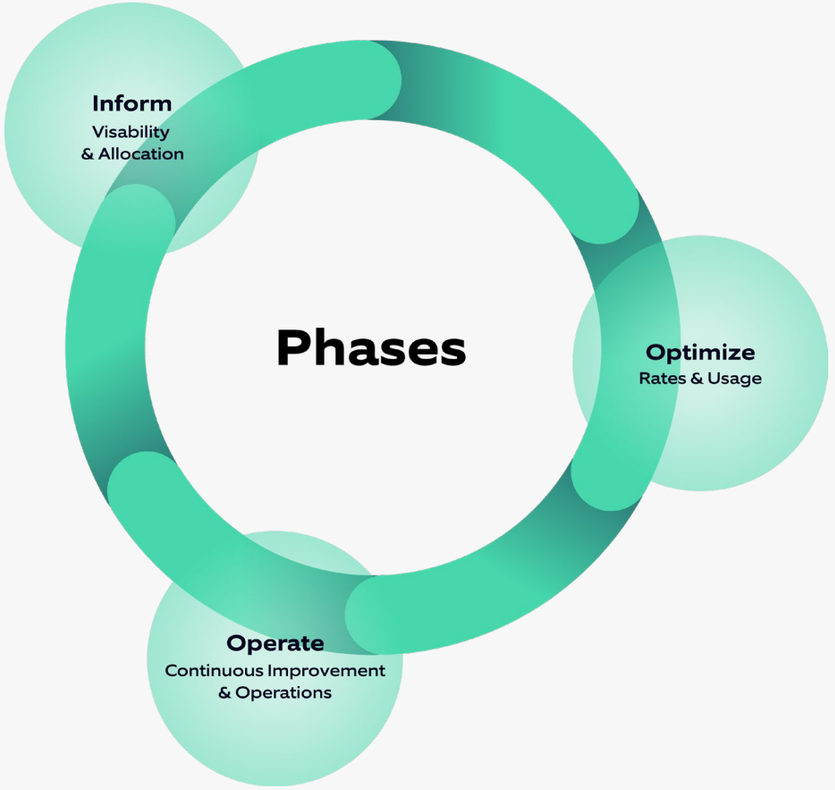
- Teams need to collaborate
- Everyone takes ownership of their cloud usage
- A centralized team drives FinOps
- Reports should be accessible and timely
- Decisions are driven by the business value of cloud
- Take advantage of the variable cost model of the cloud

FinOps helped optimize cloud spending by ~26%.

Besides driving collaboration between cross-functional teams to manage cloud spending, FinOps establishes governance procedures to enforce best practices for cloud financial management. FinOps framework comprises personas, processes, guiding principles, and six interdependent domains to bring financial accountability across the organization.

Personas





It’s time to adopt FinOps

For a much more comprehensive overview of FinOps and how it can be applied, including a guide to help kick-start your FinOps journey, click here: https://www.nagarro.com/en/whitepapers/adopt-finops-optimize-cloud-spend ebook

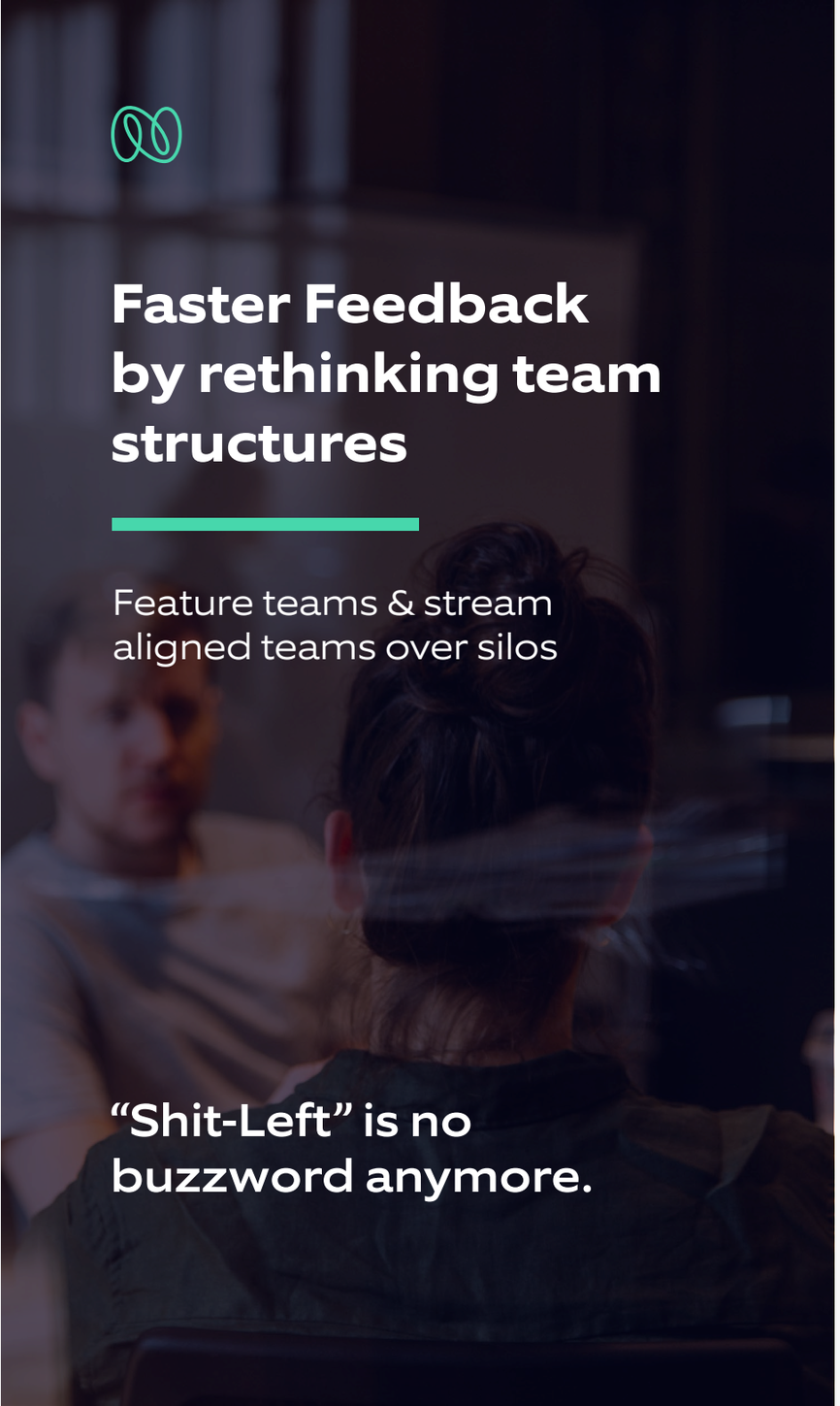
Feedback, the foundation for continuous improvement

4

Our results show that having fast and regular feedback is imperative to ensure improved performance levels. High performers have been observed to evolve organizational structures away from component teams and strict silos leaning more towards feature and stream aligned teams.

Over 80% of participants state that increased automation and provisioning provides an environment that fosters continuous improvement and fast feedback.

In this chapter, we will provide insights on advanced organizational structures and how they allow for faster and more reliant feedback.



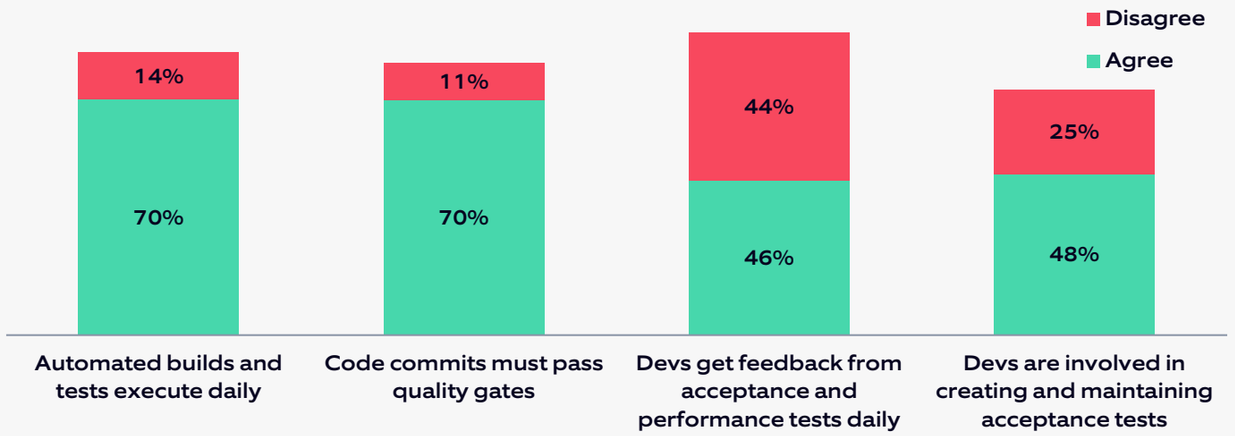
Faster Feedback by rethinking team structures

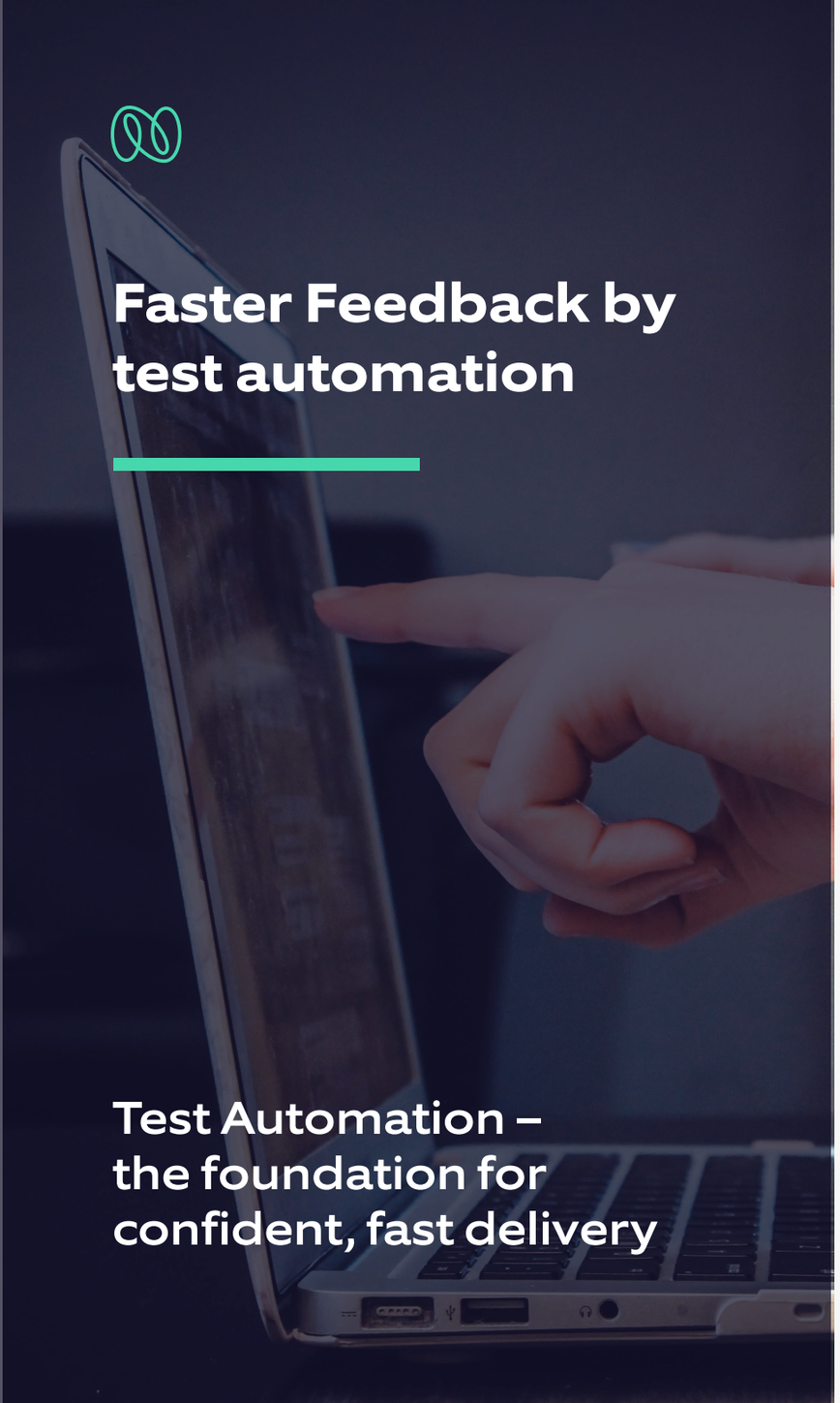
Feature teams & stream aligned teams over silos

“Shit-Left” is no buzzword anymore.

Modern team structures, like feature teams and stream aligned teams, evolve around fully enabled teams which take care of entire features - from planning to development to quality assurance. These teams can deliver value to end-users without significant third-party dependencies, quickly and effectively.

This is partly achieved by embedding automated tests across various test levels (and other types of quality gates) as a fundamental part of their software delivery pipeline. Nearly 50% of the participants state that development work also includes the creation and maintenance of automated acceptance tests, which support the generally stated “shift-left” of test activities throughout the industry. Given this ubiquitous adoption of test automation in general, the fact that almost 50% cannot get daily feedback from more complex test activities, such as acceptance tests and performance tests, highlights the need for organizations to improve how those tasks are realized by individual teams and across teams and departments.



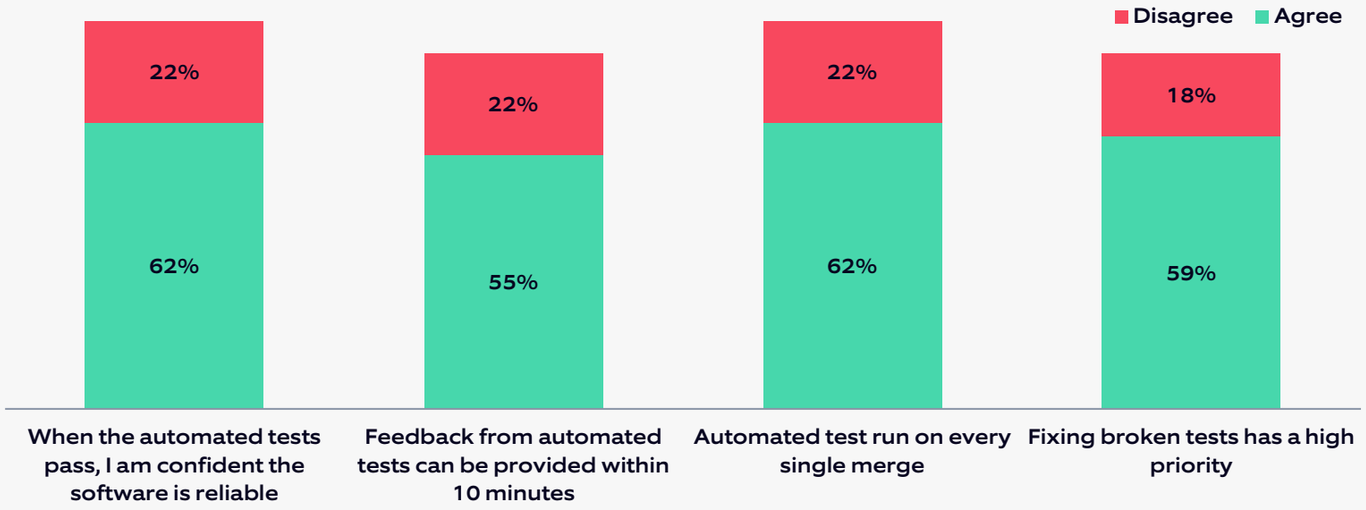


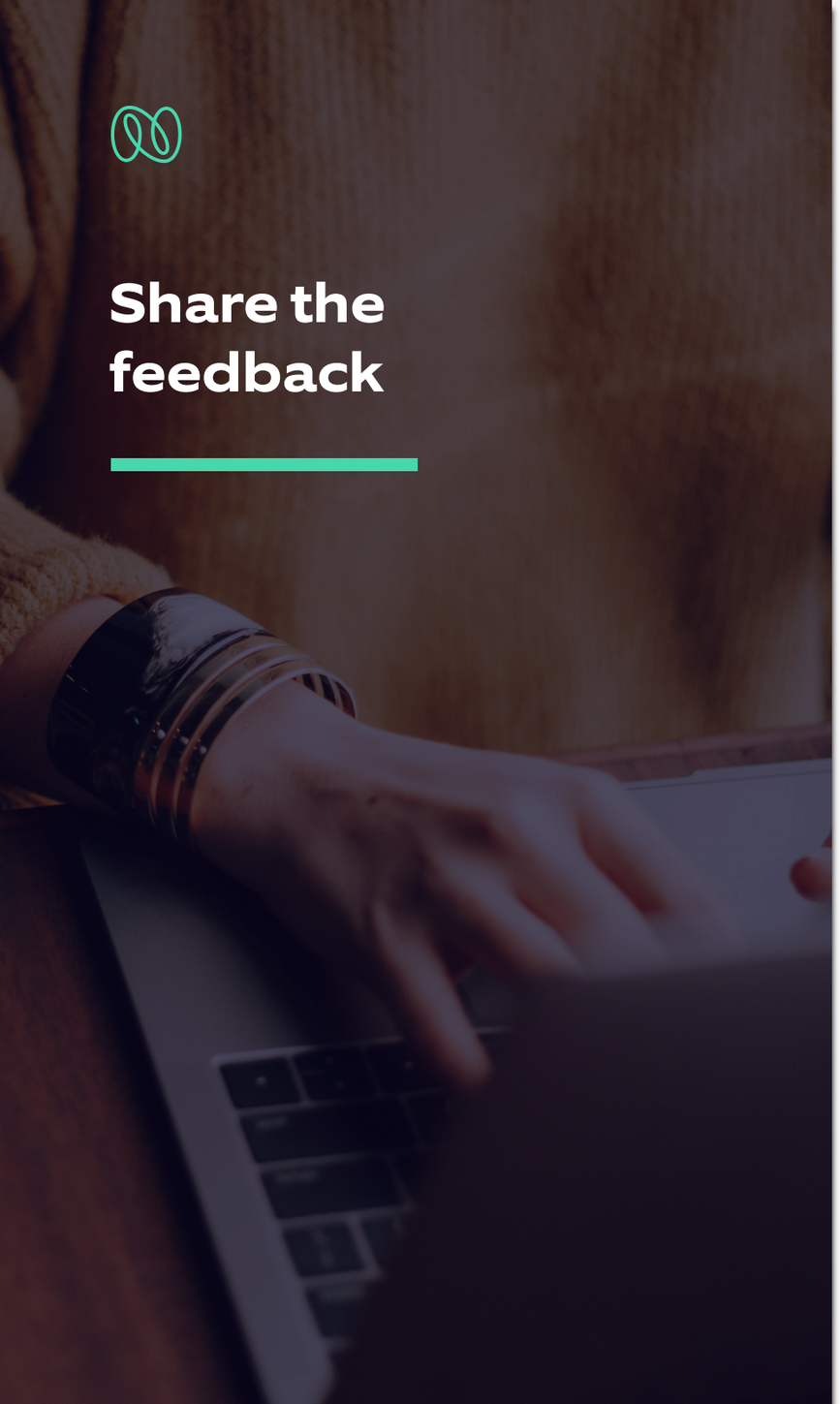
Faster Feedback by test automation

Test Automation – the foundation for confident, fast delivery

Providing a holistic view on the product quality throughout the delivery pipeline is imperative to not only increase the confidence of the team, but also of other stakeholders. No surprise then, to see in the responses, that automated tests are already an integral part of many software delivery organizations.

Our results show that 74% respondents have seamlessly integrated automated tests into their software delivery toolchain. 63% respondents state that their test suits are continuously reviewed and improved. Interestingly, even though the appreciation of test automation is pretty established, only 33% go one step further and practice test-driven development.

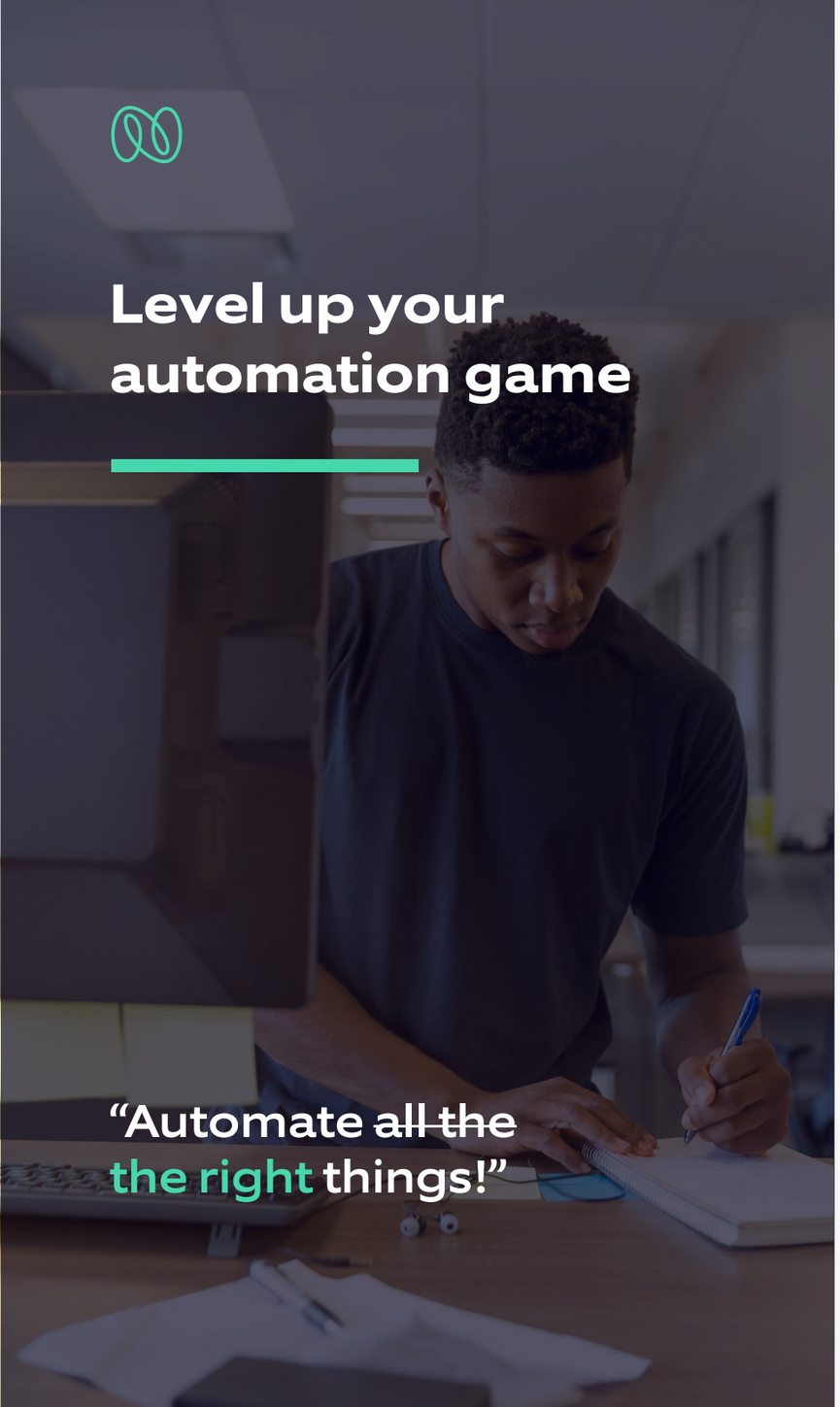




Share the feedback

While it is very important to have quality gates and test automation in place, it's still only one step in providing fast and valuable feedback. All those test results and further data like performance measurements need to be communicated in a transparent and easily reachable manner. Survey results show that while 62% respondents are sending out notifications (e.g., test results), making those results visible at a central place, this continues to be an improvement area for many, as only 48% respondents visualize test results on dashboards.

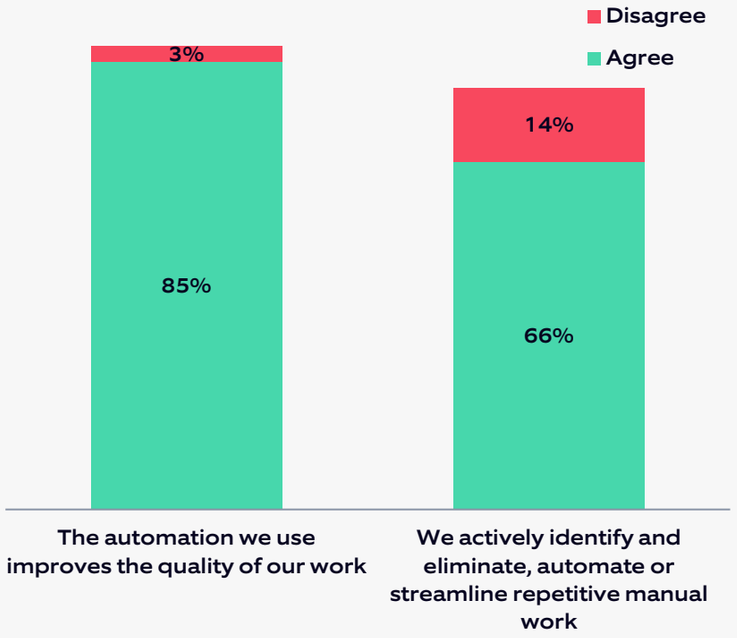
While having this visualization might not be so important in a fully automated, continuous deployment context, it can still provide helpful insights, especially into patterns that can only be identified by looking at how certain attributes are changing over time (e.g., how code coverage is increasing or decreasing in certain areas).

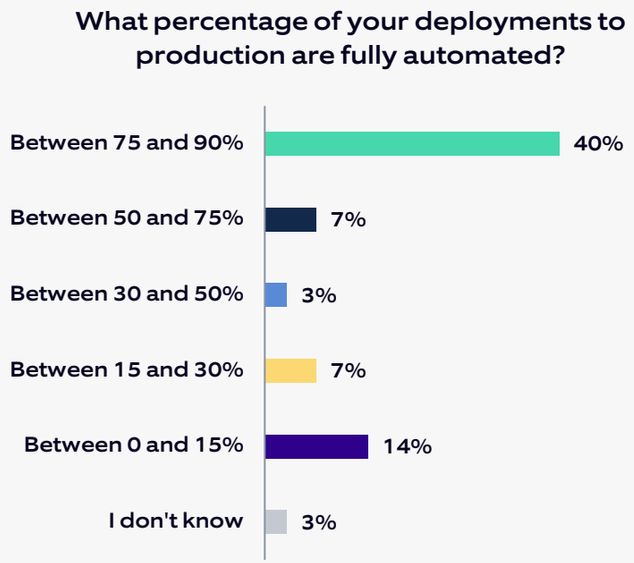


Level up your automation game

"Automate ~~all the~~ the right things!"

Manual tests still reign supreme, when it comes to finding bugs in unexpected ways. 62% of the participants are making use of them continuously, like with exploratory and acceptance testing throughout their delivery process. These manually executed tests are usually very valuable but there are other tasks which should be automated as much as possible, as is being done by 63% for most of their repetitive tasks.





Final Thoughts

In our second Nagarro State of DevOps Report, we incorporated last year's insights into our client landscape. By combining the results from our survey with empirical studies, such as DORA, we proposed ideas, approaches and findings that are supposed to help organizations achieve their goals faster and with less pain. It is important to highlight how essential these are, because these empirical research results are a crucial basis and help our entire industry immensely.

We hope this year's insights will continue to help you scale and guide your DevOps practices and ways of working.

We'd love to hear about your experiences and your comments on the survey and on the report itself. Please feel free to contact us! You can email us directly at **aqt@nagarro.com**.

“I cannot overstate how exciting it is to explore, investigate and discuss how organizations are thinking about DevOps and how they are adopting it in a specific environment. Especially with this somehow ‘uninvolved’ perspective when trying to interpret results of an anonymous survey.

I think it provides a unique possibility to focus on the very intrinsic aspects of DevOps while still reflecting on how they are relevant in real world scenarios.

I would be very glad to discuss if and how those ideas can be applied to your environment and or why this environment is likely different from many others.”

Stefan Gwihs,
Quality DevOps Practice Lead at Nagarro

Authors

Gurpreet Bhadesh

Gurpreet Bhadesh is a Cloud Consultant at Nagarro. She holds a Bachelor's and Master's degree in Business & Management and has experience working with organizations of various sizes spanning across multiple industries. Gurpreet supports clients in all aspects of the Cloud, from setting up the infrastructure to automating processes. She has a passion for helping clients reap the full benefits from the Cloud.

Stefan Gwihs

Stefan Gwihs is a Test Automation Architect and DevOps Coach and leading the Global Quality DevOps Practice at Nagarro. After completing his Bachelor's degree in computer science and subsequently a master's degree in multimedia and software development, Stefan focused primarily on agile software development and test automation. He is certified by ISTQB® and IREB and has a very rich experience in the optimal handling of IT projects, thanks to his diverse project activities.

Raffael Šala

Raffael Šala is a DevOps Coach and DevOps Community Lead at Nagarro. During the last few years, his role has shifted from being a Quality Assurance Consultant and Test Automation Expert with a focus on pure QA to a wider DevOps perspective now, on how to sustainably incorporate QA into DevOps. He is working with a very diverse range of clients, helping them achieve their full DevOps potential.

Nikhil Yadav

Nikhil Yadav is a Senior DevOps Architect at Nagarro. He holds a Bachelor's degree in Computer Science. He has around 15 years of professional IT experience and helps clients by providing consultancy around DevOps, Cloud, Security & Infrastructure. He loves automating things and is fond lover of IaC principles. Nikhil spends his free time with his family and loves running and cycling.

Appendix

When we evaluated the survey responses, we also paid attention to the tools used in your work environment along with the generic demographic information about the participants.

We don’t think it's possible to reliably link this data to our key findings discussed in the report. Tool usage, especially, is very context-specific and specific use cases most likely limit what organizations or teams can use.

Nevertheless, this information can provide a glance into technology and tool usage, which might help in future orientation or mid- to long-term technology strategy discussions.

Therefore, we have provided the aggregated information here, without any interpretation as an appendix.

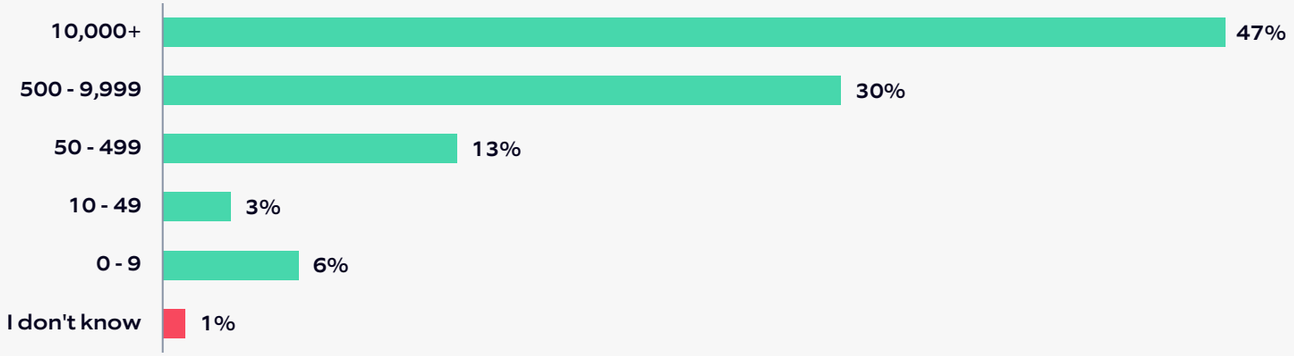
Organization

Organizations from – to

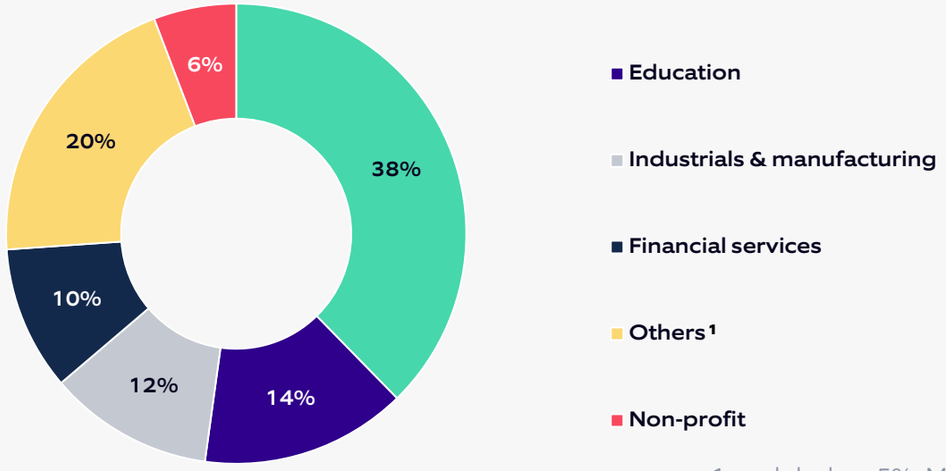
As we had shared, almost 77% of the respondents answered that they work in a large enterprise.

Almost half of them work in very large organizations of 10,000+ employees.

Organization size by employee headcount



Principal industry

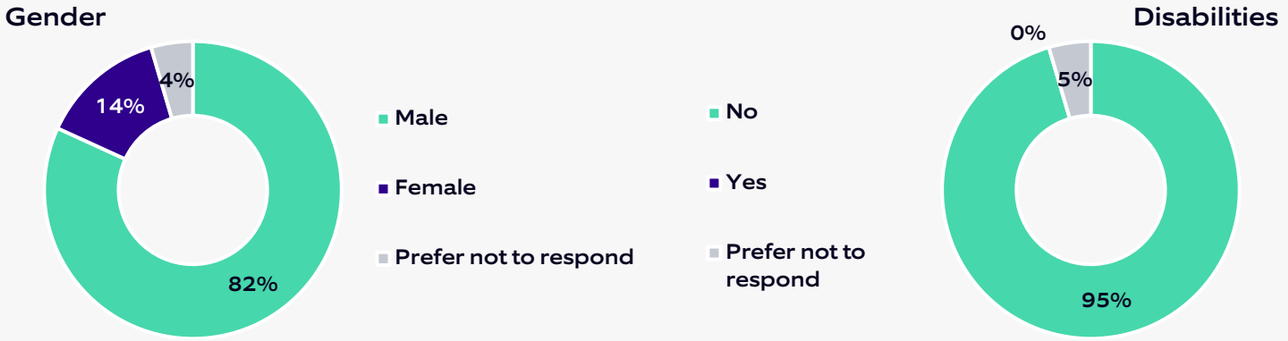


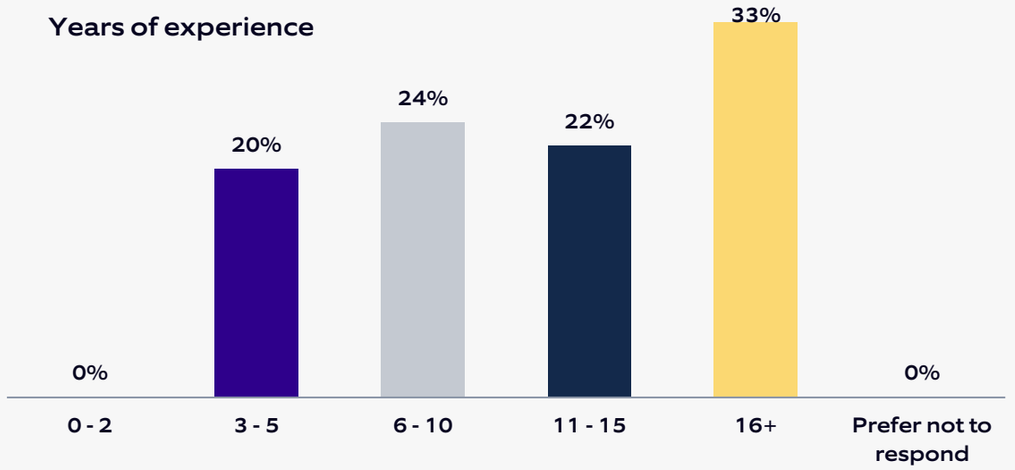
1 each below 5%: Media & entertainment, retail & e-commerce, government, telecommunications, energy

Gender, disabilities & years of experience

Under-represented groups

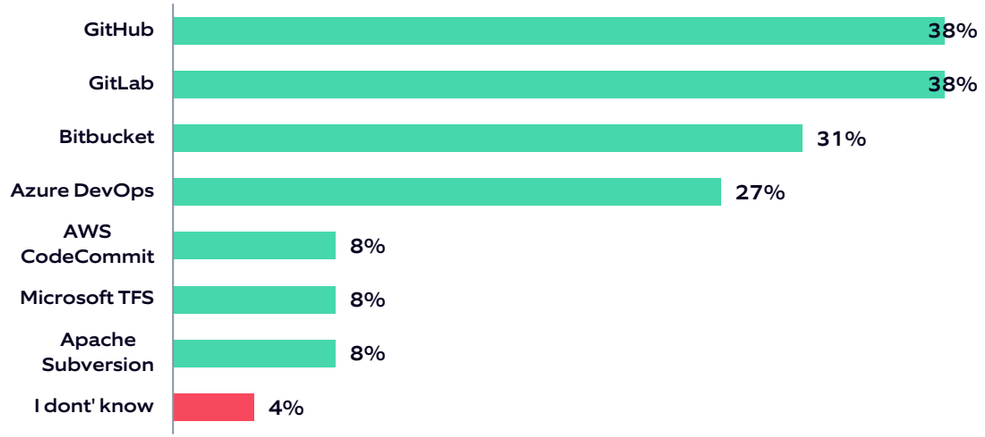
14% of those who participated in the second year of our survey identify as female, compared to 82% male. This data is consistent with demo-graphics published by other institutions[1] and highlights that female, non-binary, genderqueer, or gender nonconforming are still a minority.



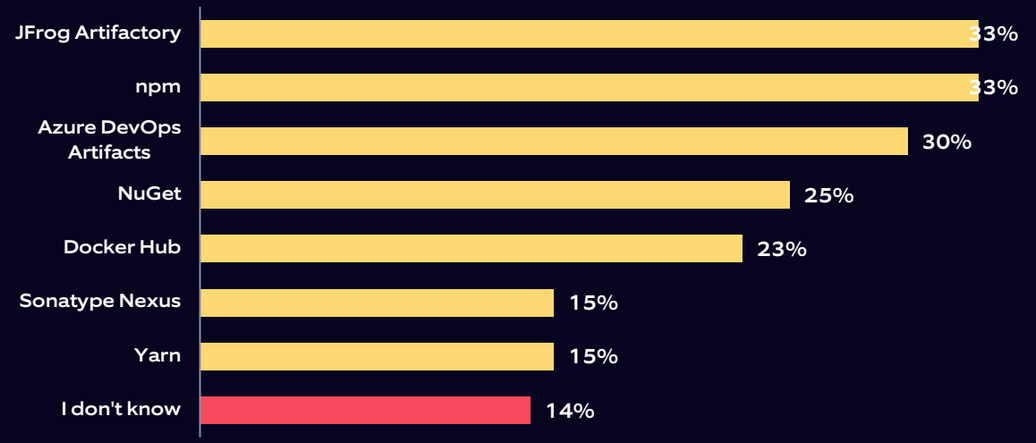


1 Accelerate State of DevOps Report 2021, StackOverflow 2022 Developer Survey

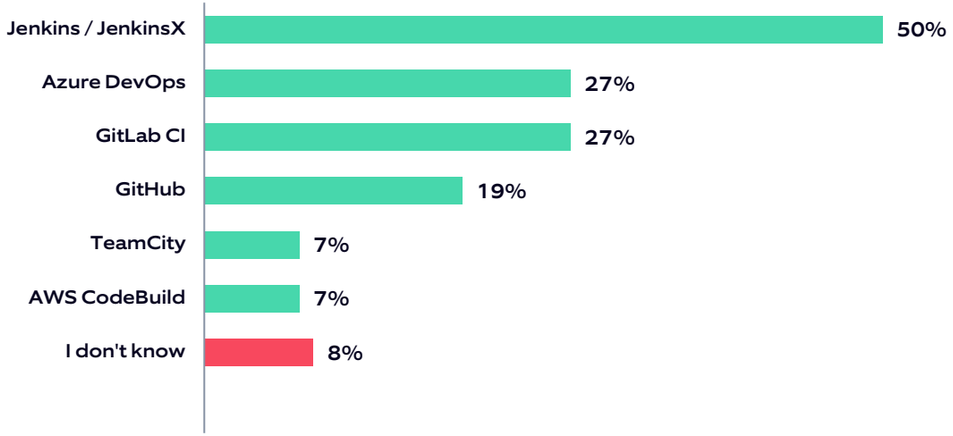
Version control system



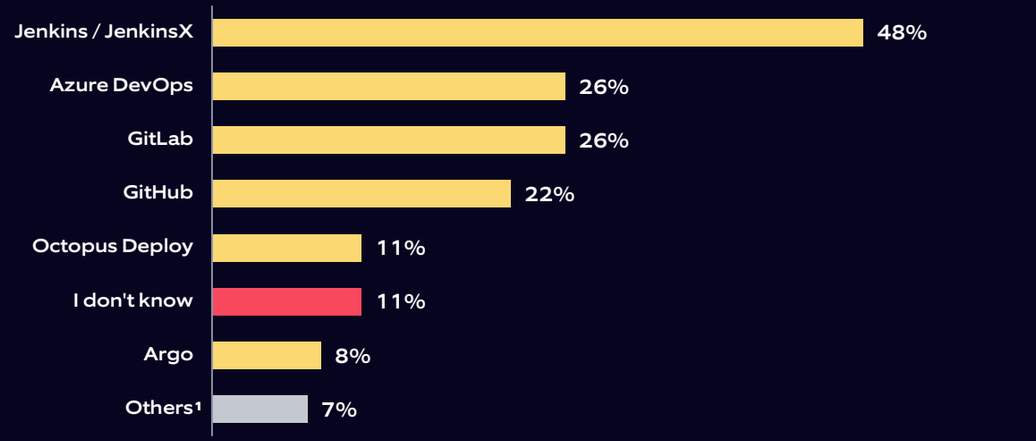
Artifact or package management tool



Continuous integration tool

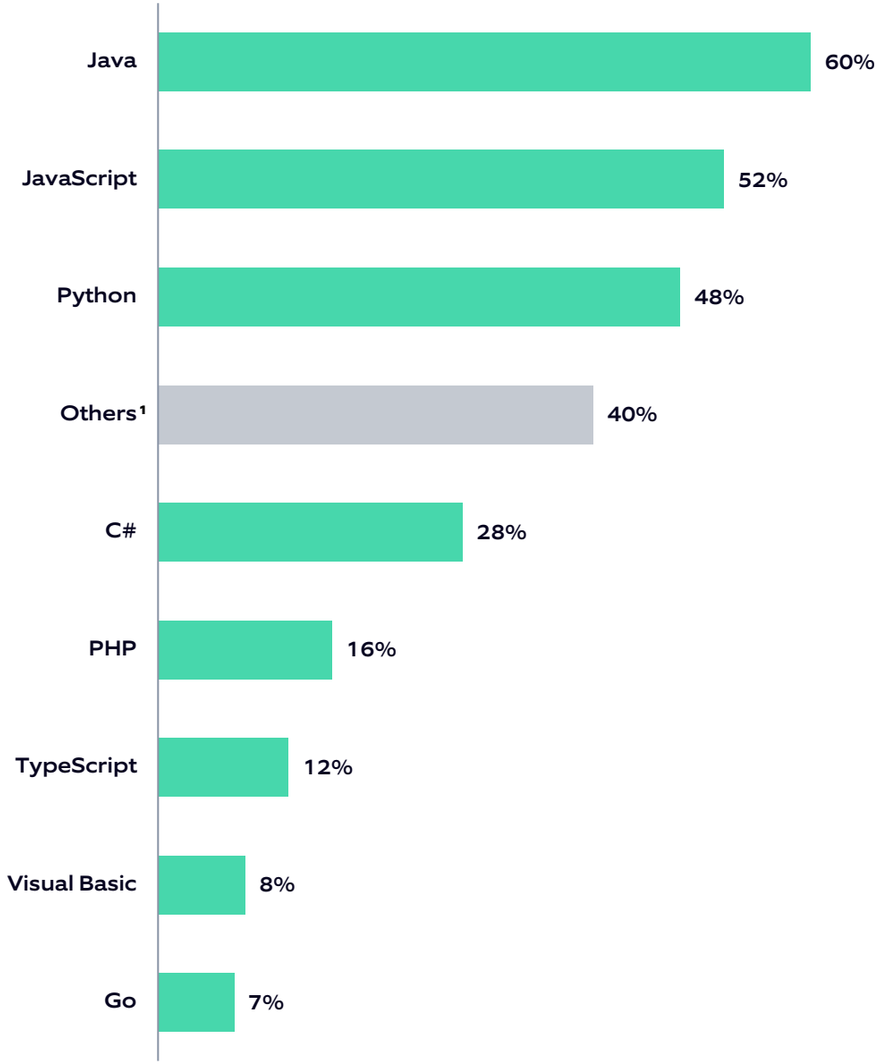


Continuous delivery tool

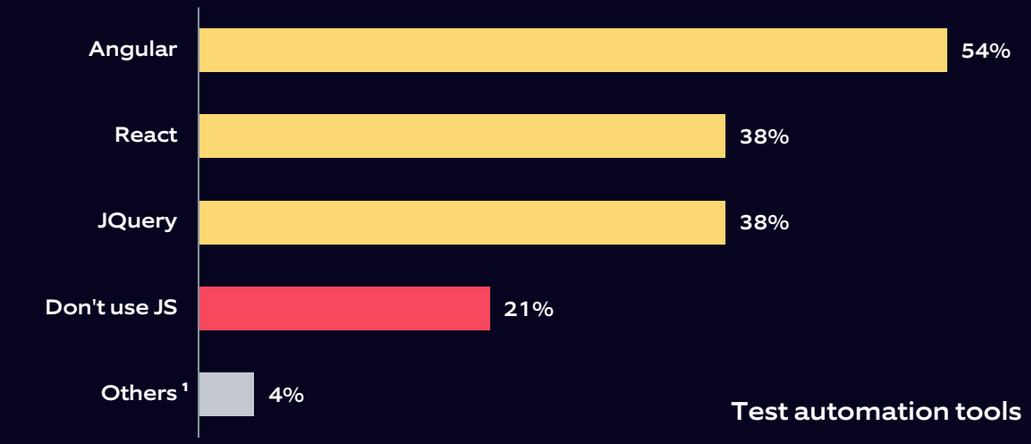


1 each below 5%: AWS CodePipeline, Spinnaker

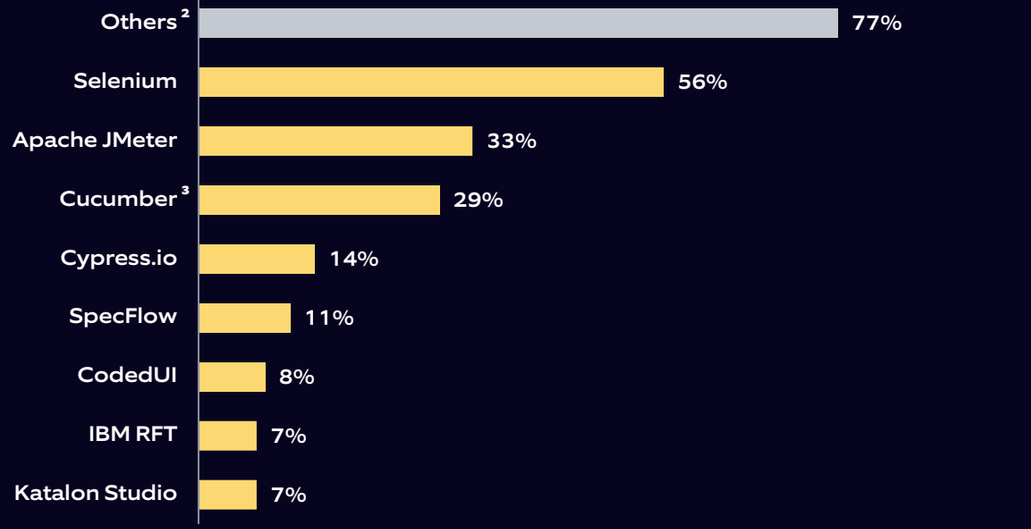
Programming languages



JavaScript frameworks



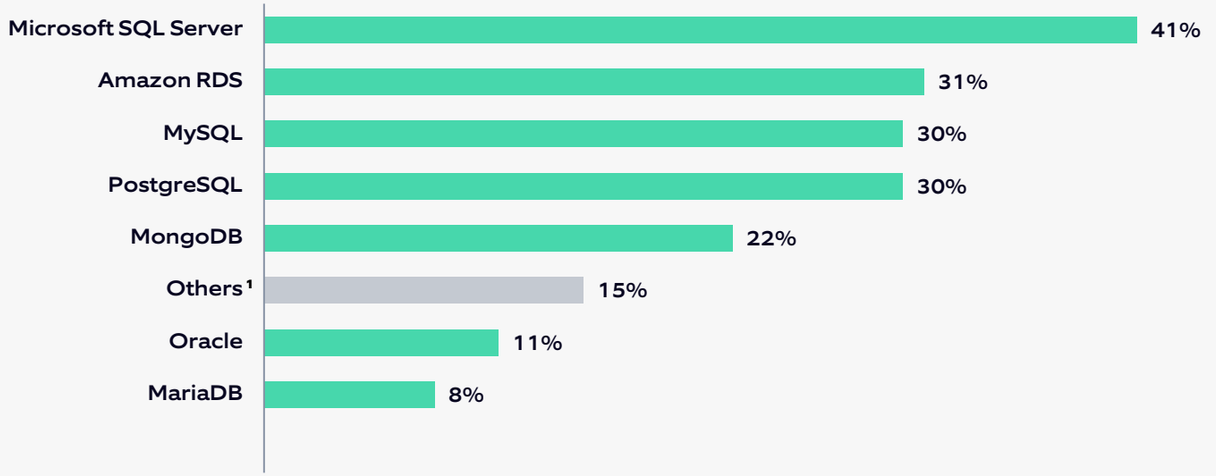
Test automation tools



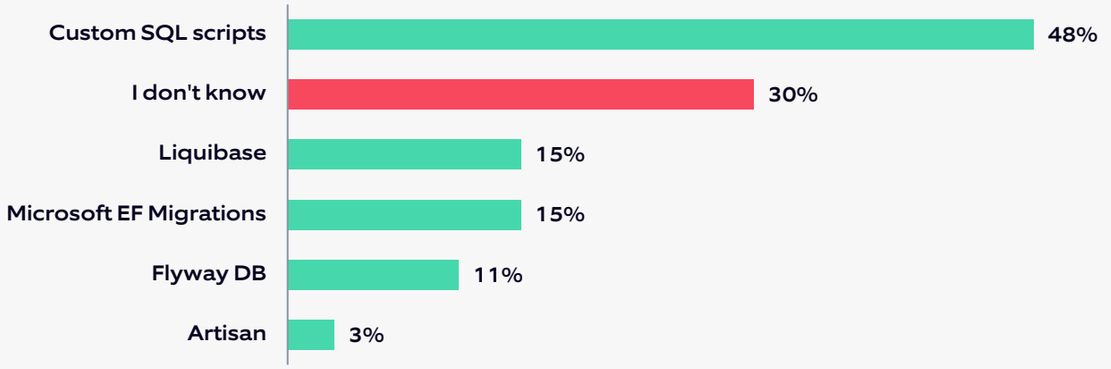
1 each below 5%: Ruby, C/C++, SAP ABAP, Mendix Studio Pro, SQL, PowerShell, Groovy
2 each below 5%: Behave, jBehave, Ranorex, eggPlant Functional, Protractor, TestComplete, HP UFT, SAP (e.g., CBTA, eCATT), k6, Postman, Robot, Gatling, Locus
3 Includes Cucumber-JVM, Cucumber.js, Cucumber.rb and similar

Database

Database software / system



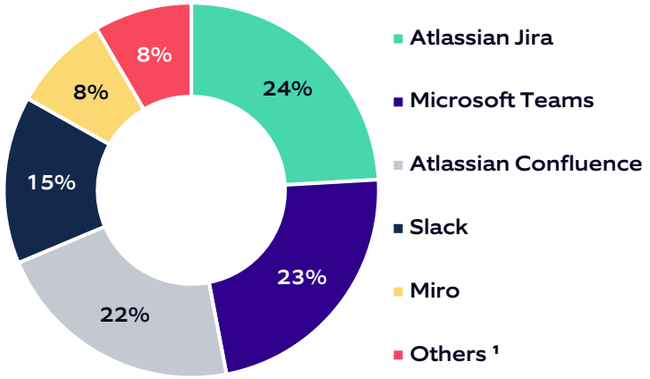
Database migration tooling



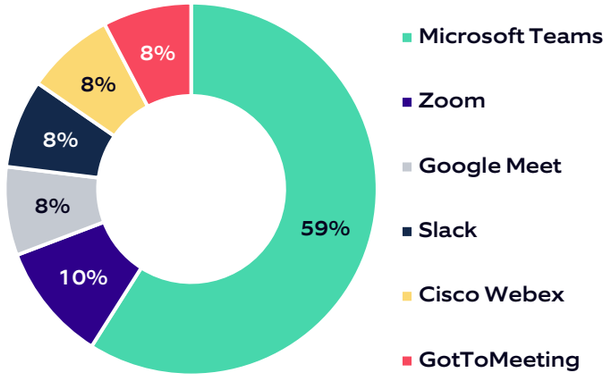
1 each below 5%: IBM DB2, Cassandra, Synapse, Cosmos DB, Clickhouse, Vertica

Collaboration, Video, Project management

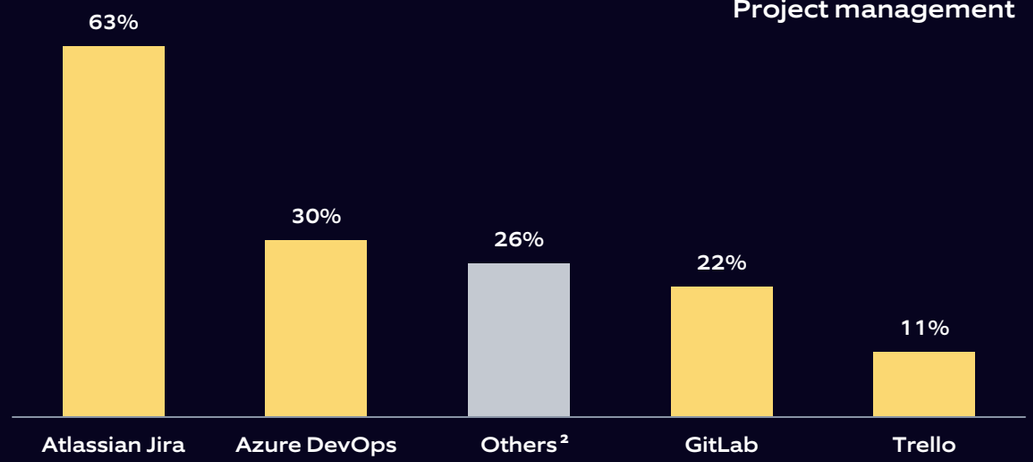
Collaboration



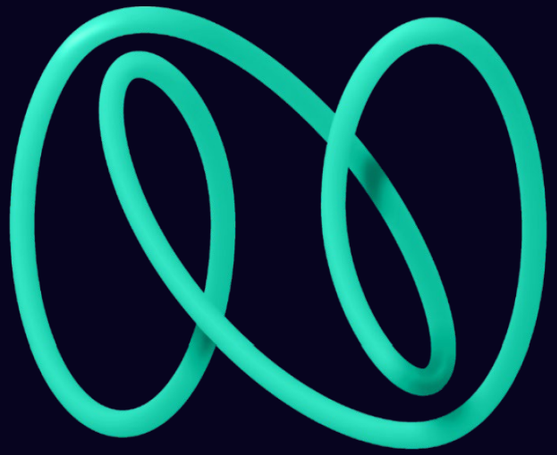
Video conferencing



Project management



1 each below 5%: Stack Overflow for Teams, Mattermost, Redmine, Mural, Mantis
2 each below 5%: Asana, Redmine, ClickUp, PMDB



Imagine what we can do together.

Let's get in touch:
aqt@nagarro.com