

**CloudCheckr**

# The Cloud Infrastructure Report 2021

A Survey of Cloud Decision Makers



# Introduction

The mass movement of corporate technology infrastructure from on-premises data centers into the public cloud has arguably been the most significant change in IT strategies in the past decade. Cloud infrastructure adoption has fundamentally changed the way IT operates, from budgets and architecture to org charts and outcomes.

As any transformation matures, management capabilities are a key factor in success. The processes and tools that track and optimize availability, performance, security, and costs are necessary to understand complex environments and track business outcomes. Expertise is critical, and a comprehensive cloud strategy and program to pool and focus internal skills and resources can be an important step in cloud management maturity.

This research shines a light on current experiences with public cloud infrastructure and strategies being used to get the most from these investments. Has cloud adoption continued on its growth trajectory, or has it plateaued? What barriers continue to cause friction in cloud adoption? How are cloud management practices evolving? How has the pandemic impacted 2021 budgeting and planning? Are companies adopting Cloud Centers of Excellence (CCoEs) and if so, what is the outcome?

The following report is based on an online survey of cloud infrastructure decision makers. This study was sponsored by CloudCheckr and conducted by Dimensional Research. A total of 304 qualified individuals in IT or business stakeholders completed the study. All had decision-making responsibility for significant public cloud infrastructure investments at a company with more than 500 employees. Certain questions were repeated from similar 2017 and 2019 studies to examine changing trends.



# Key Findings



## **Organizations are increasing their overall use of cloud**

- 57% report more than half of their infrastructure is in the cloud, up from 47% last year
- Companies that primarily use cloud infrastructure mainly got there by proactive shifting (39%) and opportunistic transitioning (46%)
- 64% expect they will be fully in the public cloud within five years
- There continue to be barriers to rapid cloud migration including security concerns (44%), compliance and regulations (42%), lack of application support (41%) and more



## **Managing cloud costs is an ongoing problem**

- 93% face challenges with budgeting 2021 infrastructure cloud costs
- 94% have experienced unexpected cloud costs
- Only 31% report that they monitor and optimize public cloud costs effectively
- There's a major disconnect amongst business and IT professionals regarding how well cloud costs are managed



## **Investments in internal cloud strategies and teams are paying off**

- 59% have a CCoE team, up from 47% in 2017
- Organizations with a dedicated CCoE team see higher benefits than those where cloud expertise is not organized
- CCoEs would benefit most from investments in architecture strategy (64%) and better cloud management tools (57%)
- 98% would benefit from additional technology capabilities

# Detailed Findings

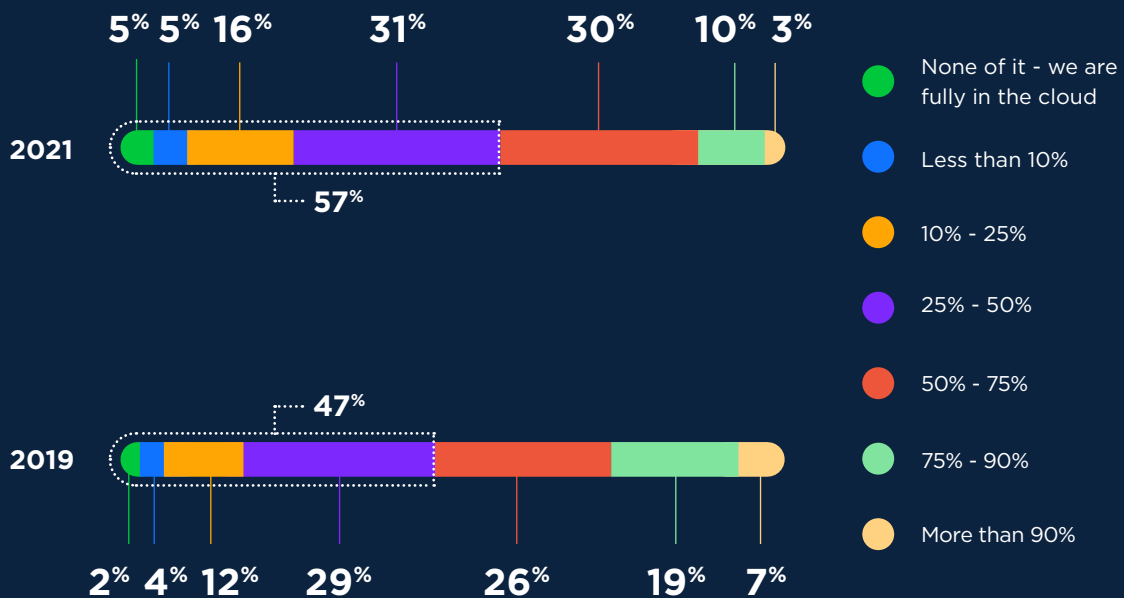


# Cloud infrastructure users are increasing their overall use of cloud

## 2021 crossed the halfway point for infrastructure hosted in the cloud

This 2021 study captures an important milestone in the adoption of—or migration to—cloud infrastructure. Among companies that have made a significant investment in public cloud infrastructure, well over half (**57%**) report that they have more than half of that infrastructure in the cloud. This is up from just under half (**47%**) in 2019. (It should be emphasized that this study only included companies that made a significant investment in public cloud infrastructure. This study does not make any claims about the overall balance of on-prem and cloud infrastructure across every possible technology environment.)

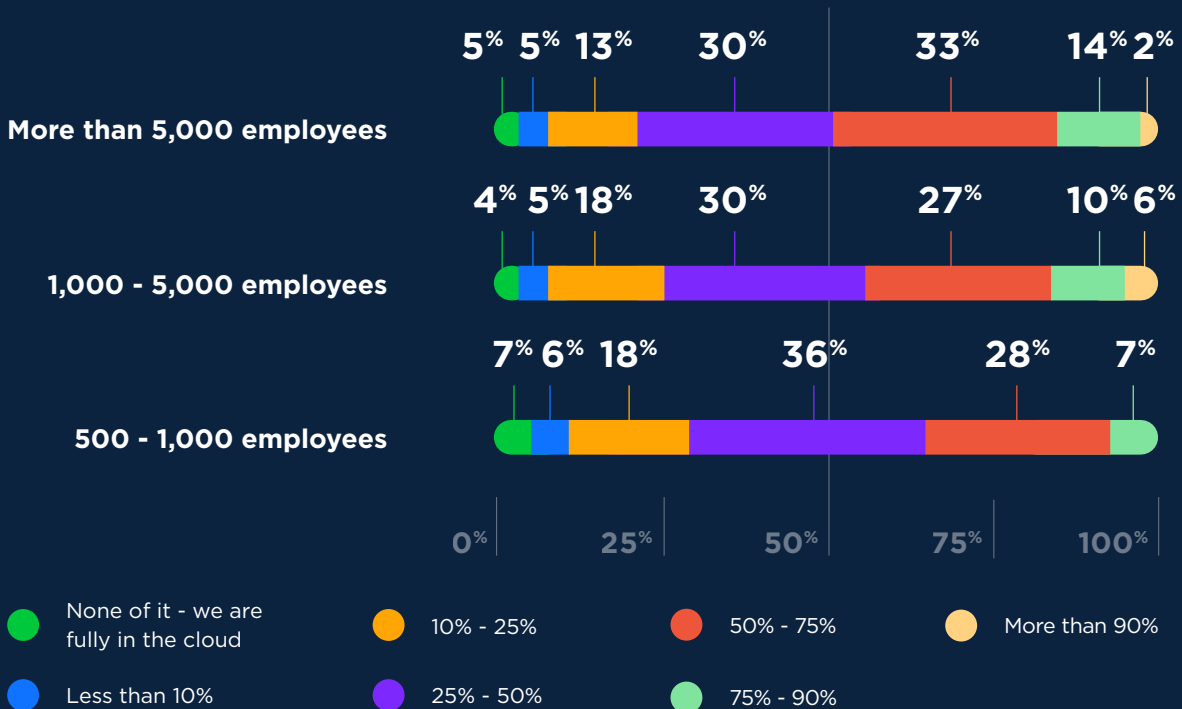
### Approximately what percentage of your infrastructure is still on-prem today?



It is particularly interesting to note that in our 2019 study, cloud stakeholders underestimated their future level of growth. Though understandably, the shift to remote work due to COVID-19 had an influence. In that prior study, we asked participants to predict what their cloud usage would be in two years. Only 53% expected that more than half of their infrastructure would be in the cloud by this time, lower than the 57% that actually passed that milestone goal this year.

Smaller companies, with less access to the expertise required to run large data centers, have traditionally led adoption of public cloud infrastructure. This remains consistent in 2021, with companies with fewer than 1,000 employees reporting higher percentages of their infrastructure in the cloud. However, it should be noted that companies of all sizes that responded to this survey have passed the halfway point of infrastructure in the cloud.

### Approximately what percentage of your infrastructure is still on-prem today? (By company size)



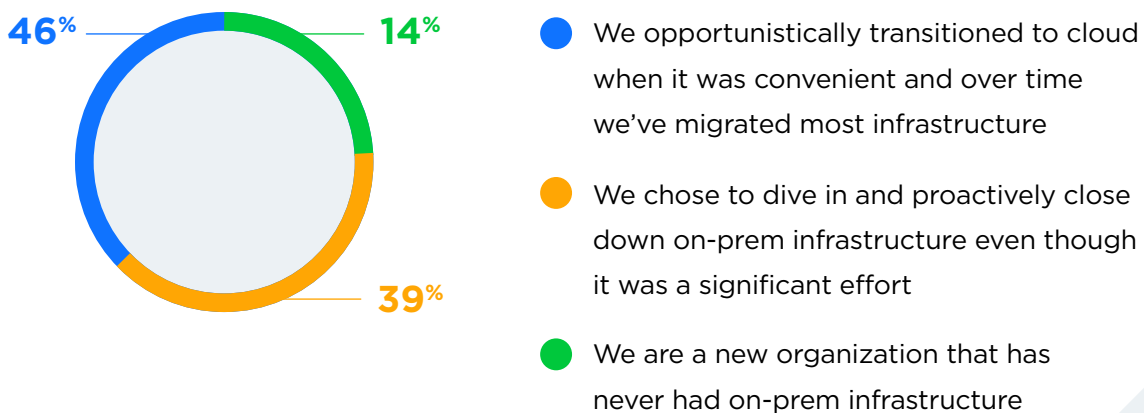
## There is no single path for moving to the cloud

In recent years, there has been significant focus on companies that take a “cloud first” approach, where they prioritize cloud in all infrastructure decisions over any on-premises options. However, this research shows that this is not the only way to become a primarily cloud environment.

Looking just at companies that have at least three-quarters of their infrastructure in the cloud, we see that there have been a wide variety of paths followed to get to that point. The most frequently reported (**46%**) is also the most pragmatic. These organizations did not have a specific strategy of taking aggressive moves to transition to the cloud. Instead, they identified opportunities that made sense and over time achieved a significant cloud presence.

A slightly lower percentage of companies (**39%**) chose a path of being proactive. These companies put significant effort into identifying places where it made sense to migrate to the cloud in order to aggressively shut-down on-prem data centers. A small number (**14%**) did not have to go through the step of migration as they started with cloud infrastructure from the beginning.

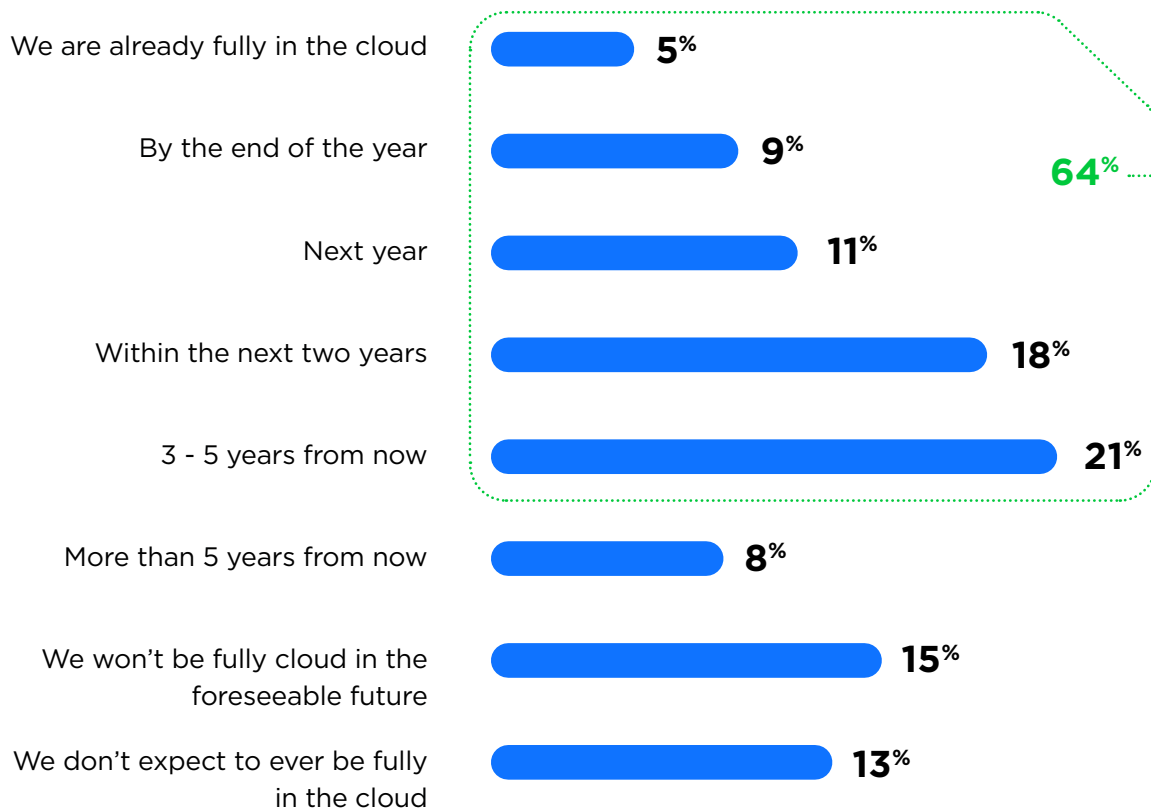
### What path did your company take to become a primarily cloud environment?



## Many plan to be fully in the cloud within five years

The growth of public cloud infrastructure does not appear to be slowing. Almost two thirds (**64%**) of companies surveyed report they will be fully in the public cloud within five years. While only a small number (**5%**) are already fully in the cloud today, most companies (**87%**) do expect to get there at some point in the future.

### When does your company expect to be fully in the public cloud?



### Familiar barriers continue to create friction in a full transition to cloud infrastructure

While we continue to see aggressive growth in public cloud infrastructure adoption, there are still familiar barriers accelerating adoption.



For the companies that have on-prem infrastructure, the top reasons given for not being fully transitioned to the cloud are security (**44%**), compliance and regulations (**42%**), and applications that are not supported in cloud (**41%**). It's worth noting that security and compliance concerns are notorious roadblocks in the cloud industry as technology continues to rapidly change and evolve over time. Several participants also took the time to write in "other" concerns, with the most common being that they simply need more time.

The one barrier to cloud migration that is only rarely reported is a simple lack of motivation. A remarkably small number (**4%**) cite the reason their organizations are still on-prem is a lack of interest.

## Why has your company not completely moved to a cloud environment?

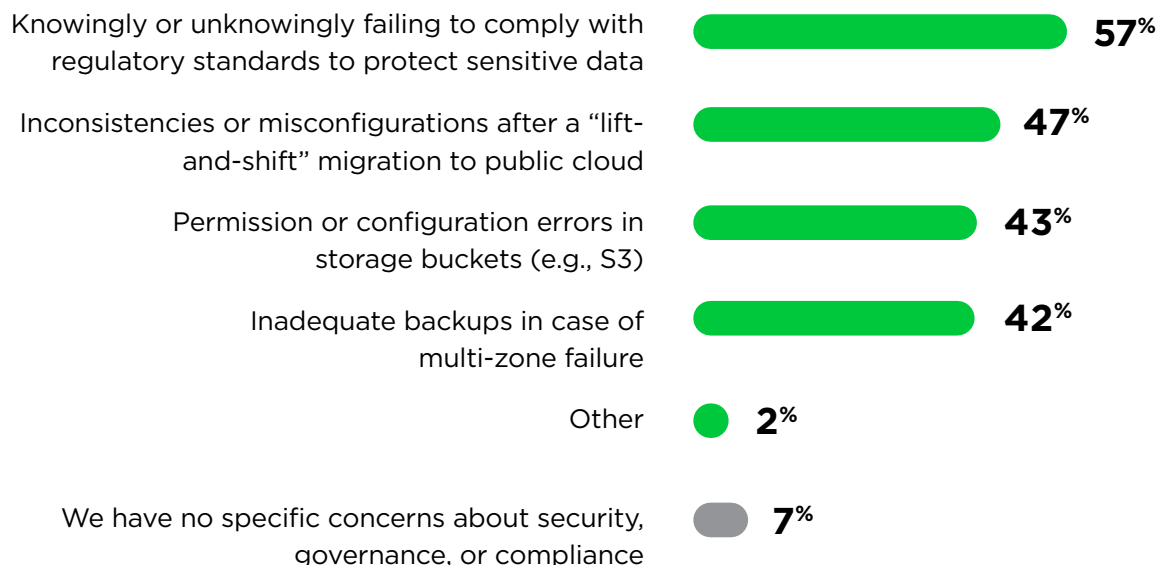


## Cloud security, governance, and compliance are common concerns

Regulations are a fact of life when conducting business in 2021, and public cloud infrastructure is no exception. Almost all participants in our study (95%) reported that their companies were required to follow regulatory compliance guidelines (HIPAA, GDPR, PCI DSS, NIST, etc.) in their cloud environments. Unsurprisingly, almost the same number of cloud stakeholders (93%) report that they have concerns about potential issues in their cloud environments related to security, governance, and compliance.

The most reported compliance concern is a potential failure to abide by regulatory standards for sensitive data — whether knowingly or unintentionally (**57%**). Cloud decision makers also reported concerns about the potential for misconfigurations after a cloud migration (**47%**), configuration or permission errors in storage buckets such as S3 (**43%**), and inadequate backups (**42%**). Some participants also reported concerns about overall potential for misconfigurations, the impact of API changes, incorrect data retention policies, and the potential for cloud provider breaches.

### Which of the following areas cause you the most concern about potential for security, governance, or compliance issues?



# Managing cloud costs is an ongoing problem

## Cost management tops list of cloud focus areas for 2021

As reported in the first section of this report, security continues to be a concern in public cloud environments and was reported as the number one barrier to moving fully to the cloud. However, when asked about areas of improvement in cloud management for 2021, there is another area for improvement that pops up with the same urgency as security (both **63%**): Cost management.

### Which of the following areas of your company's public cloud use would your company like to improve for 2021?



## 2021 cloud budgeting process has faced many challenges

Budgeting for 2021 has been a difficult task for cloud stakeholders. Most (93%) report that they have faced difficulties. The most frequently reported issues relate to the impact of the pandemic. Over half (55%) report that 2020 was so unusual it is difficult to use it as a baseline, and close to half (48%) say they are dealing with uncertainty caused by pandemic-related factors such as employees coming back to the office. Close to a third (30%) cite an increase in extreme usage spikes that cause budgeting difficulties, and a similar number (29%) are dealing with erratic demand. About 1 in 5 (21%) say they have not received guidance from their business stakeholders that is needed for planning. Several participants also cited other budgeting challenges, such as a lack of steady usage required for planning, overall company growth, struggles with demand planning, and lack of support from public cloud vendors to help right size capacity.

### What challenges are you facing in budgeting public cloud costs for 2021?



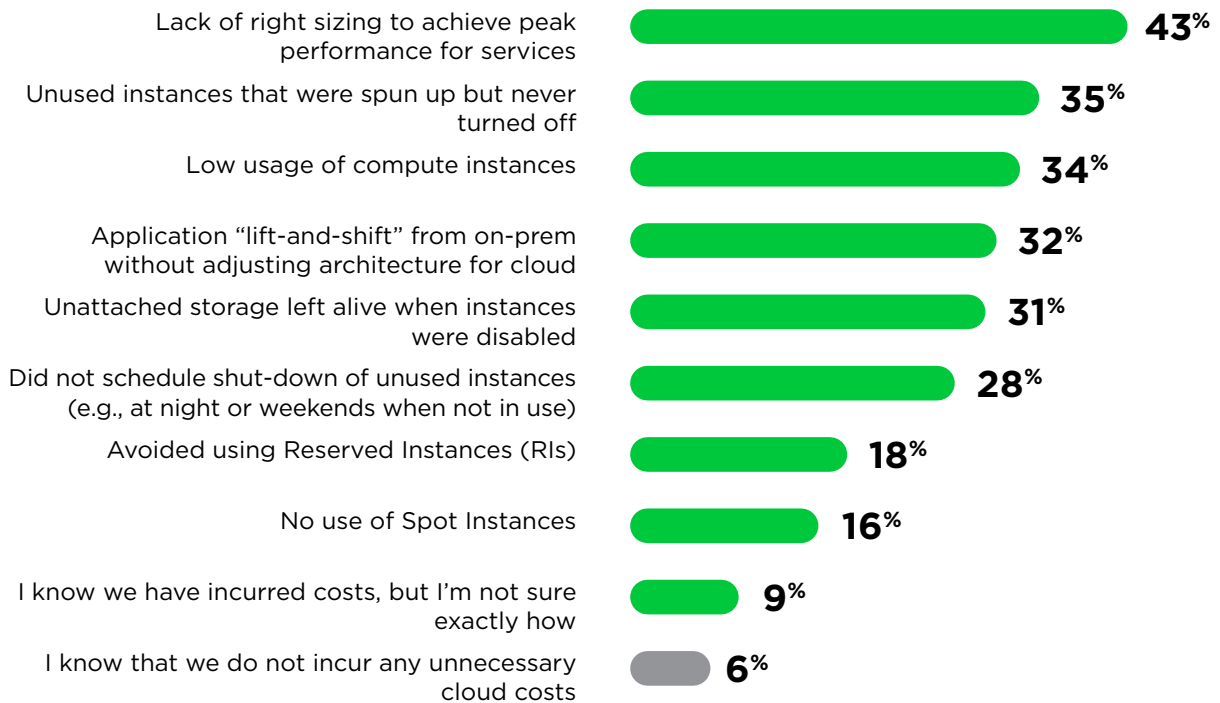
## Unexpected cloud costs are ubiquitous

The primary benefit of cloud usage is that you pay only for what you use. But that same benefit also means cloud usage must be paid for, even if it was not planned. Since cloud adoption became more common, there have been many stories told about nasty surprise cloud bills. Most cloud users (94%) have experienced some kind of unexpected costs with their public cloud usage.

Cloud stakeholders report a wide range of factors that can drive unexpected cloud costs including lack of right sizing (**43%**), unused instances that are never turned off (**35%**), low usage of cloud instances (**34%**), application migrations that don't adjust architecture for the cloud (**32%**), unattached storage that is left alive when instances are disabled (**31%**), and much more.

These issues are common and can be driven by many factors, which is why organizations must be incredibly diligent about monitoring them. Prevention is key, and can be established with tools that offer full-time monitoring and automation.

### Has your company incurred unexpected costs with your public cloud providers in any of the following ways?



## Companies struggle to effectively manage cloud costs

Cloud stakeholders recognize that they need to do better at optimizing cloud costs. Less than a third (**31%**) characterize their teams as “effective” at managing and optimizing cloud costs. Most do try, with only a small number (**8%**) reporting that they don’t make any effort to monitor or optimize cloud costs. The most typical cloud teams (**62%**) are able to monitor costs but cannot consistently use that information to manage costs.

There is a particularly alarming disconnect between the abilities reported by executives and their teams. Executives are far more likely (41%) to report that they are effective at managing and optimizing costs than either team managers (27%) or individual contributors (26%).

### How would you describe your company’s ability to monitor and optimize public cloud related costs?

Choose the one answer that most closely applies

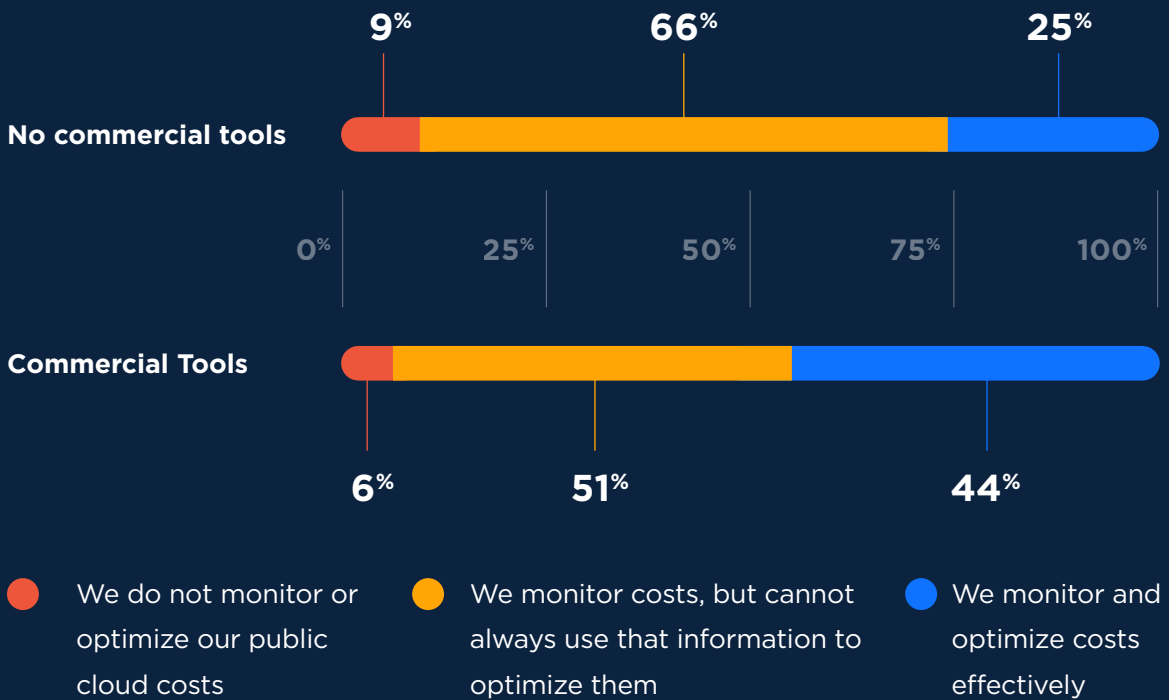


Good tools can make a big difference to management outcomes. Cloud stakeholders report that they use a wide variety of tools for managing cloud costs and budgets. Most (71%) use the management tools provided natively by their cloud vendors. An alarming half (50%) are still using spreadsheets. There were also reports of using open-source (27%) or in-house (37%) tools for cost management.

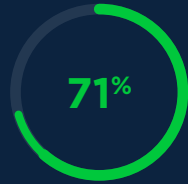
About a third (30%) use commercially available cloud cost management solutions. This group is far more confident in their ability to effectively monitor and optimize cloud costs (**44%**) than those that do not use commercial solutions (**25%**).

## How would you describe your company's ability to monitor and optimize public cloud related costs?

By use of cloud management tools



## What tools does your company use to manage cloud costs and budgeting?



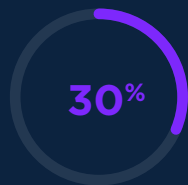
Tools provided by the cloud vendors



Spreadsheets or other manual methods



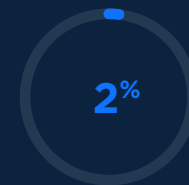
In-house developed tools



Commercial or third-party cloud cost management solutions



Open-source cloud cost management solutions



We do not use any tools to manage cloud costs

## Business stakeholders report much higher confidence in cost management abilities

The cloud stakeholders in this study included a mix of both business roles (finance, accounting, procurement, or vendor sourcing) and IT stakeholders (architecture, security, operations, infrastructure, or applications). While the different types of stakeholders reported similar answers for questions related to cloud adoption and

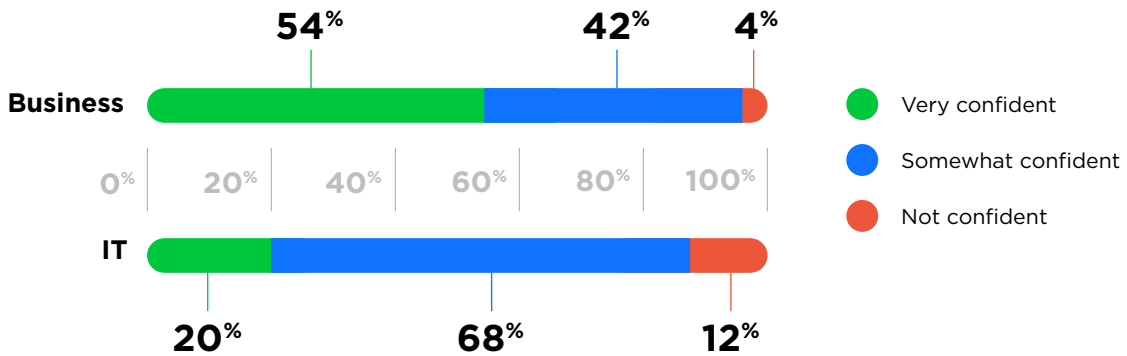


challenges, there was a notable divergence in answers related to managing cloud costs. The data paints a picture that business stakeholders are far more confident in their ability to manage cloud costs than their IT counterparts, raising the question: are they overconfident?

Business stakeholders are two times more likely to report that their teams are effective at managing and optimizing costs (46%) than IT cloud decision makers (23%). Similarly, business stakeholders are nearly three times more likely (**54%**) than those in IT roles (**20%**) to report that they are “very confident” in their organization’s visibility into all public cloud costs.

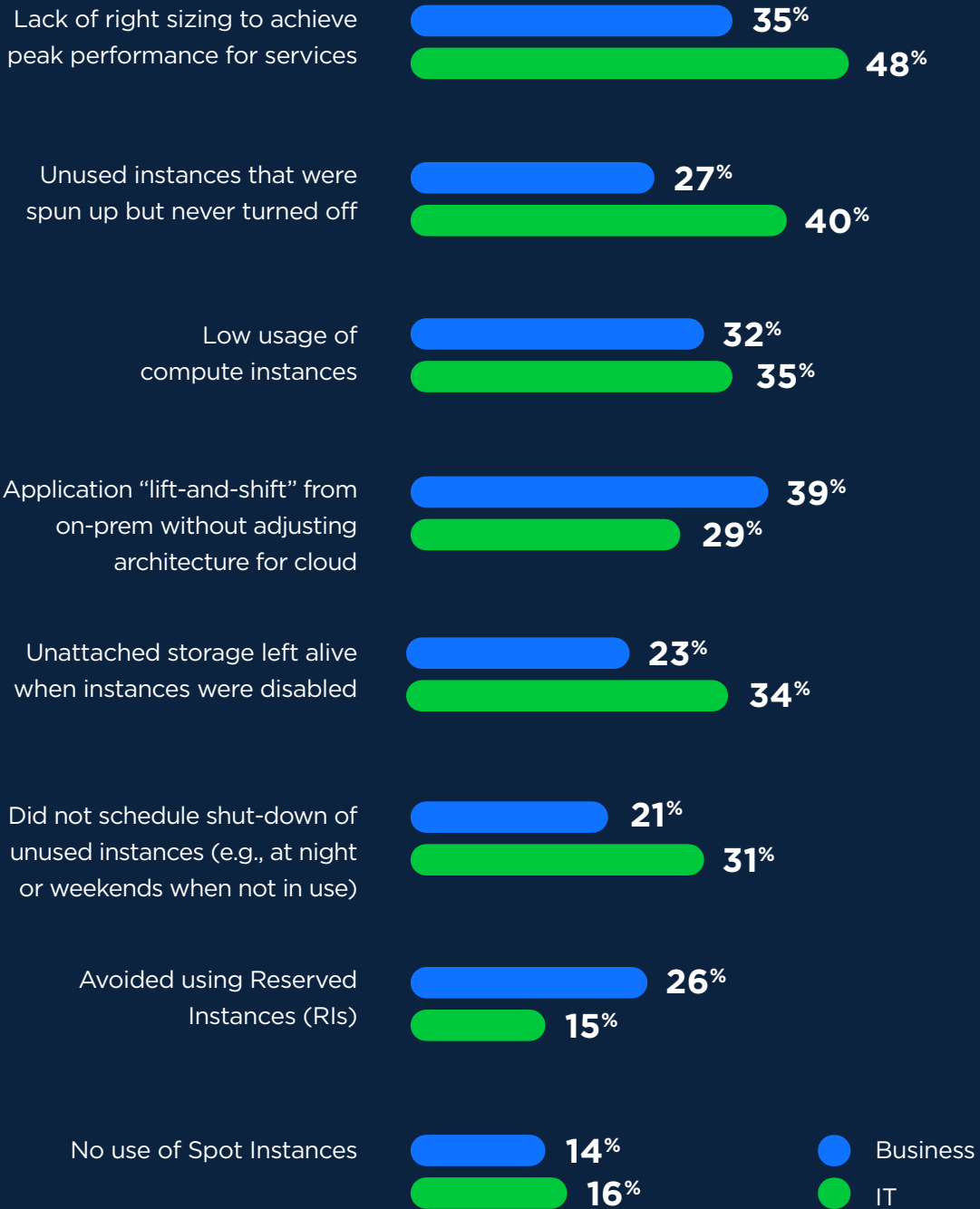
Alignment is crucial for any business initiative to be successful. The research here, however, tells us that there is a concerning disconnect in alignment around cloud management today.

### How confident are you that your company has visibility into all aspects of your company’s public cloud costs?



Revisiting our question on the source of unexpected cloud costs may give us some insight into the difference in confidence levels between business and IT roles. Many unexpected costs are the result of rather technical details, which business stakeholders are much less likely to report, perhaps because they have a lack of understanding of the cost impacts.

## Has your company incurred unexpected costs with your public cloud providers in any of the following ways? (By role)



## Investments in internal cloud strategies and teams are paying off

As enterprises continue to increase public cloud infrastructure investments, their need for expertise and other resources has also grown. Many companies have added headcount or are educating existing personnel, investing in additional tools, reorganizing responsibilities, and much more. Cloud maturity includes centralization and coordinating decision making across teams. To understand this aspect of cloud maturity, we gave participants a definition of a Cloud Center of Excellence (CCoE) and asked them questions about it.

**DEFINITION:** *A Cloud Center of Excellence (CCoE) is a cross-functional team of people responsible for developing and managing the cloud strategy, governance, and best practices that the rest of the organization can leverage to transform the business using the cloud. The CCoE leads the organization as a whole in cloud adoption, migration, and operations. It may also be called a Cloud Competency Center, Cloud Capability Center, or Cloud Knowledge Center.*

### Organizational roles most involved in the success of a public cloud infrastructure investment:

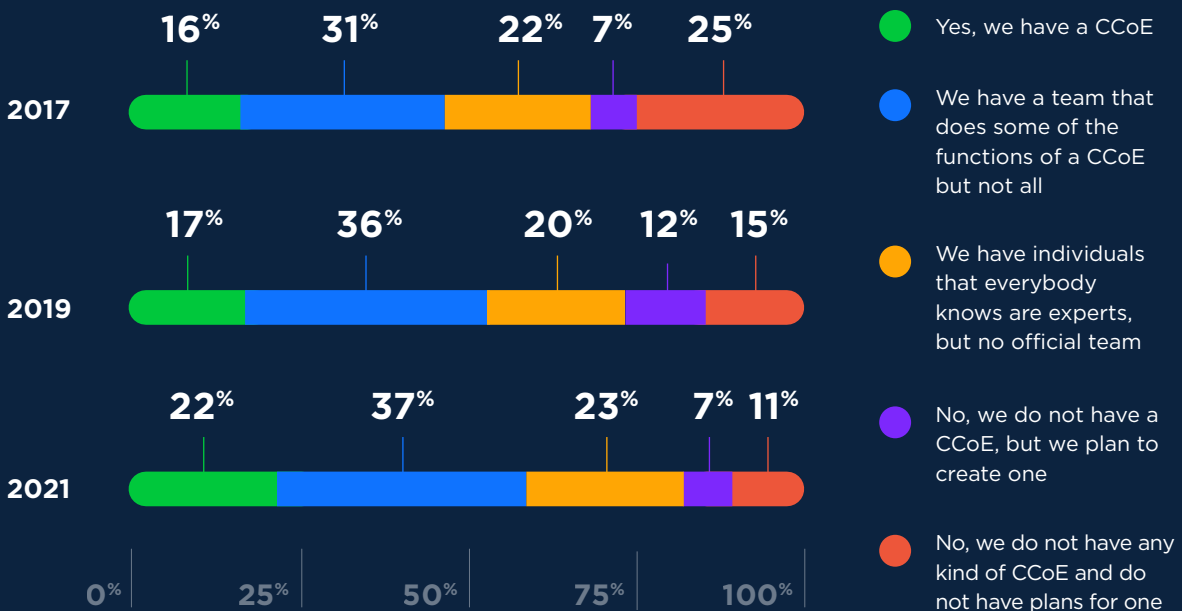


## CCoE adoption continues to increase

CCoEs can take on many forms. For some companies it is an official team with a formal reporting structure and clear responsibilities for decision making. Other companies do have a team that manages some aspects of cloud strategy, but with limited responsibilities. Many companies, especially those early on in their adoption of cloud, have an informal approach to a CCoE where there are no specifically assigned responsibilities, but there are experts that everybody knows takes on those functions.

There is a clear trend in the evolution of CCoE adoption. The number of companies with a formal CCoE has grown from only **16%** in 2017 to **22%** in 2021, while the number of companies with a CCoE team has jumped from only 47% in 2017 to 59% in 2021. At the other end of the spectrum, there is a significant drop in the number of cloud stakeholders who say they don't have any interest in a CCoE (**11%** in 2021 vs. **25%** in 2017).

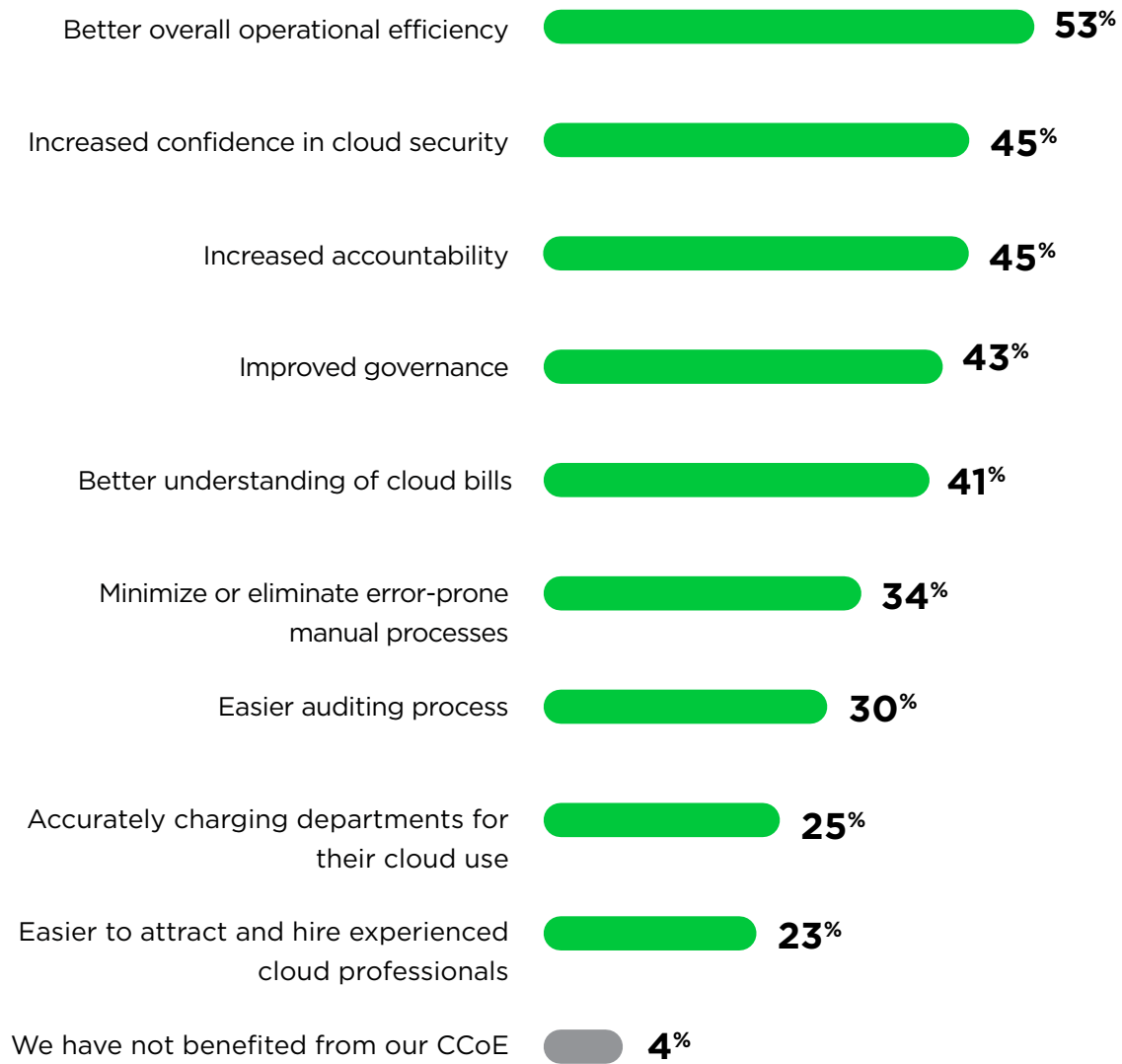
### Do you consider your company to have a CCoE?



## CCoEs have many benefits – including cost management

Companies that have adopted a CCoE overwhelmingly (96%) report that they have benefited, with the most common values reported in areas of efficiency (**53%**), accountability (**45%**), security (**45%**), and governance (**43%**). Cost management also benefits from CCoE investments, including better understanding of cloud bills (**41%**), easier auditing processes (**30%**), and more accurate chargebacks (**25%**).

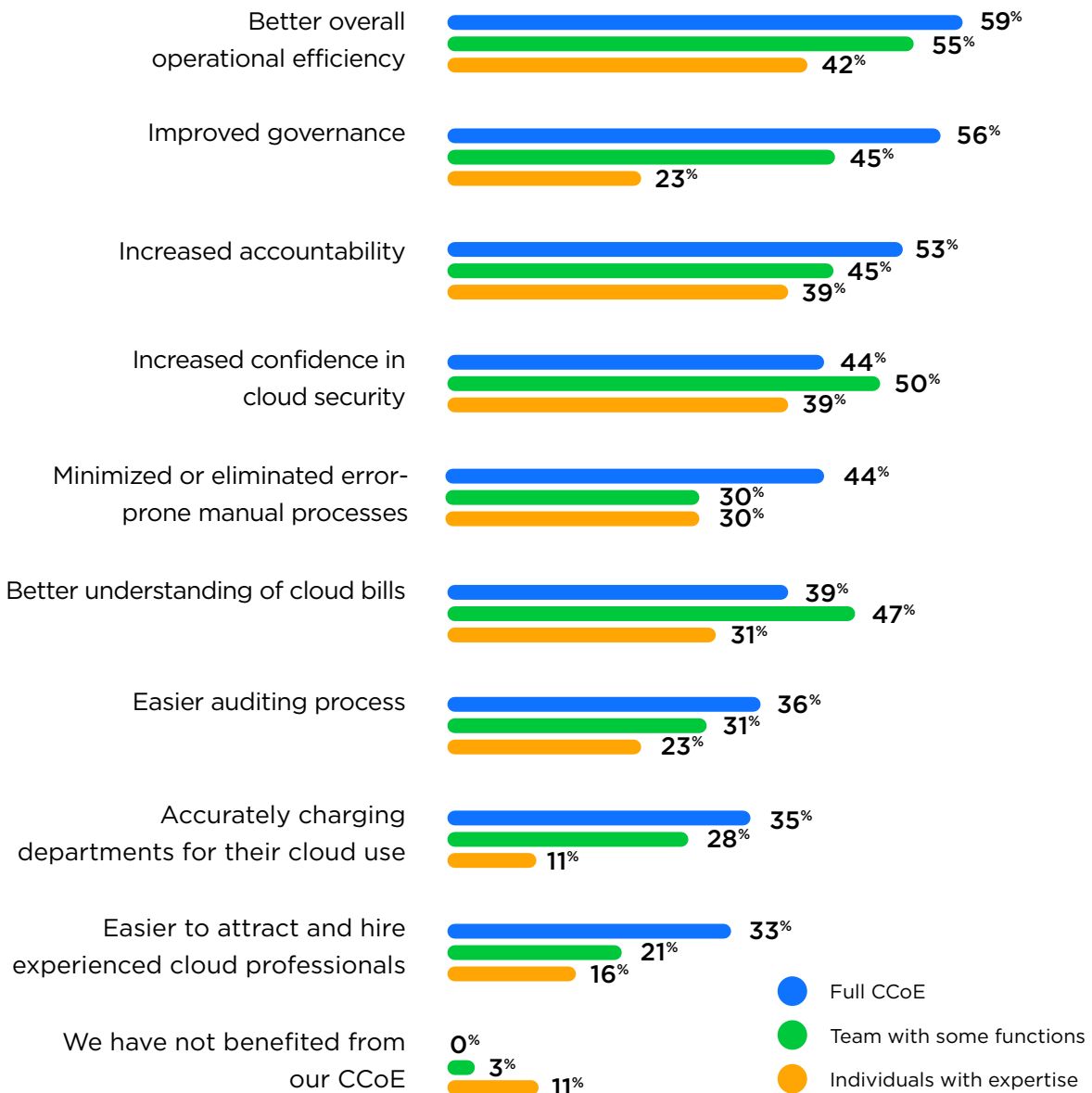
### How has your organization benefited by having a CCoE?



## More mature CCoEs report a higher level of benefits

CCoE maturity makes a clear difference. Organizations with a full CCoE, including dedicated staff and clear responsibilities, report higher levels of almost all types of benefits compared to organizations that rely on individuals with expertise.

### How has your organization benefited by having a CCoE? (By type of CCoE)



## CCoE investments expected to impact outcomes

Cloud stakeholders are clear on the specific types of CCoE investments that will yield outcomes, with three areas of investment jumping to the top of the list. These top impacts are expected to come from architecture strategy (**64%**), tools (**57%**), and investment in staff expertise (**52%**). Interestingly, cloud stakeholders are far less likely to view investments in new hires or additional management layers as having a potential for improving the overall outcome of their CCoE.

### In your opinion, what type of investment in your CCoE would have the greatest impact on outcomes?



## Cloud stakeholders see value in additional technology capabilities

There is strong agreement (98%), that cloud companies would benefit from additional cloud management capabilities, particularly the ability to operate in high-security environments (59%). Also cited are a need for solutions that are enterprise ready for demanding environments (48%), customizable architectures for fast onboarding (45%), single governance platform for all team members (43%), ability to apply business management functions across child accounts (42%), audit-ready reports (42%), and support for a wide range of compliance frameworks (42%).

## Which of the following cloud management capabilities would your company find beneficial?

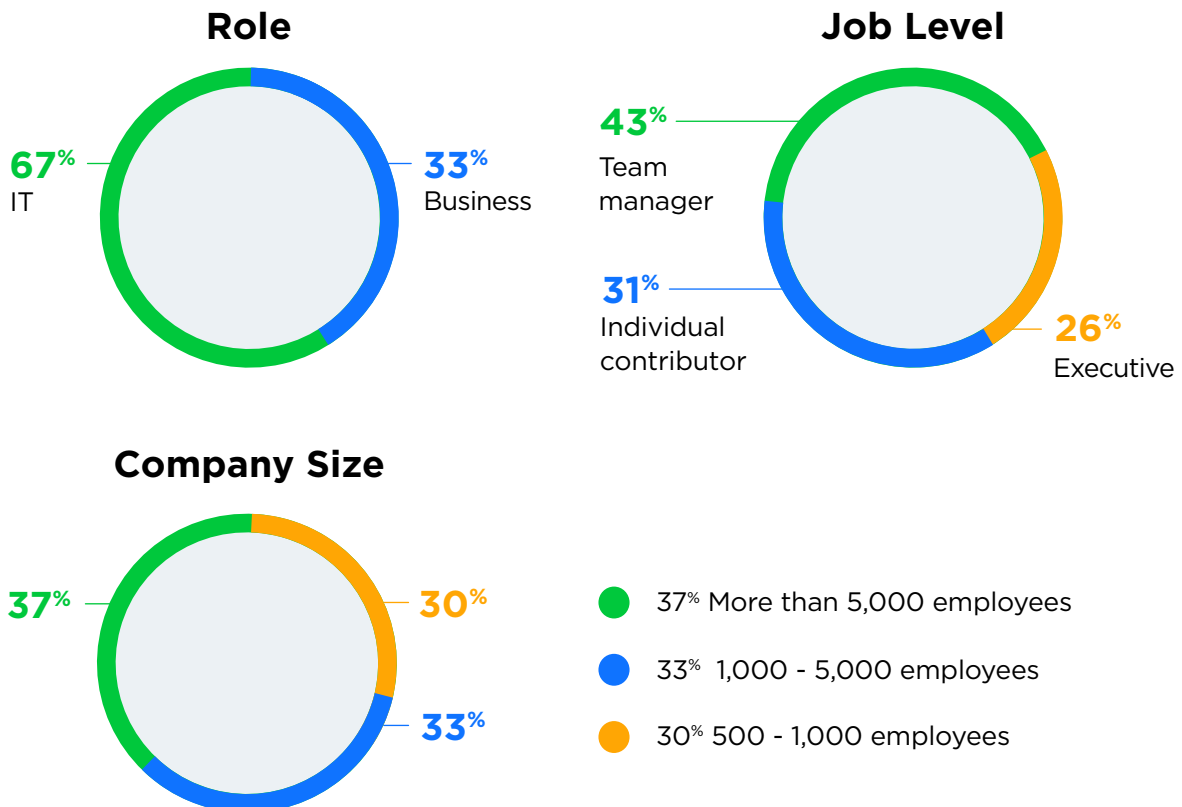




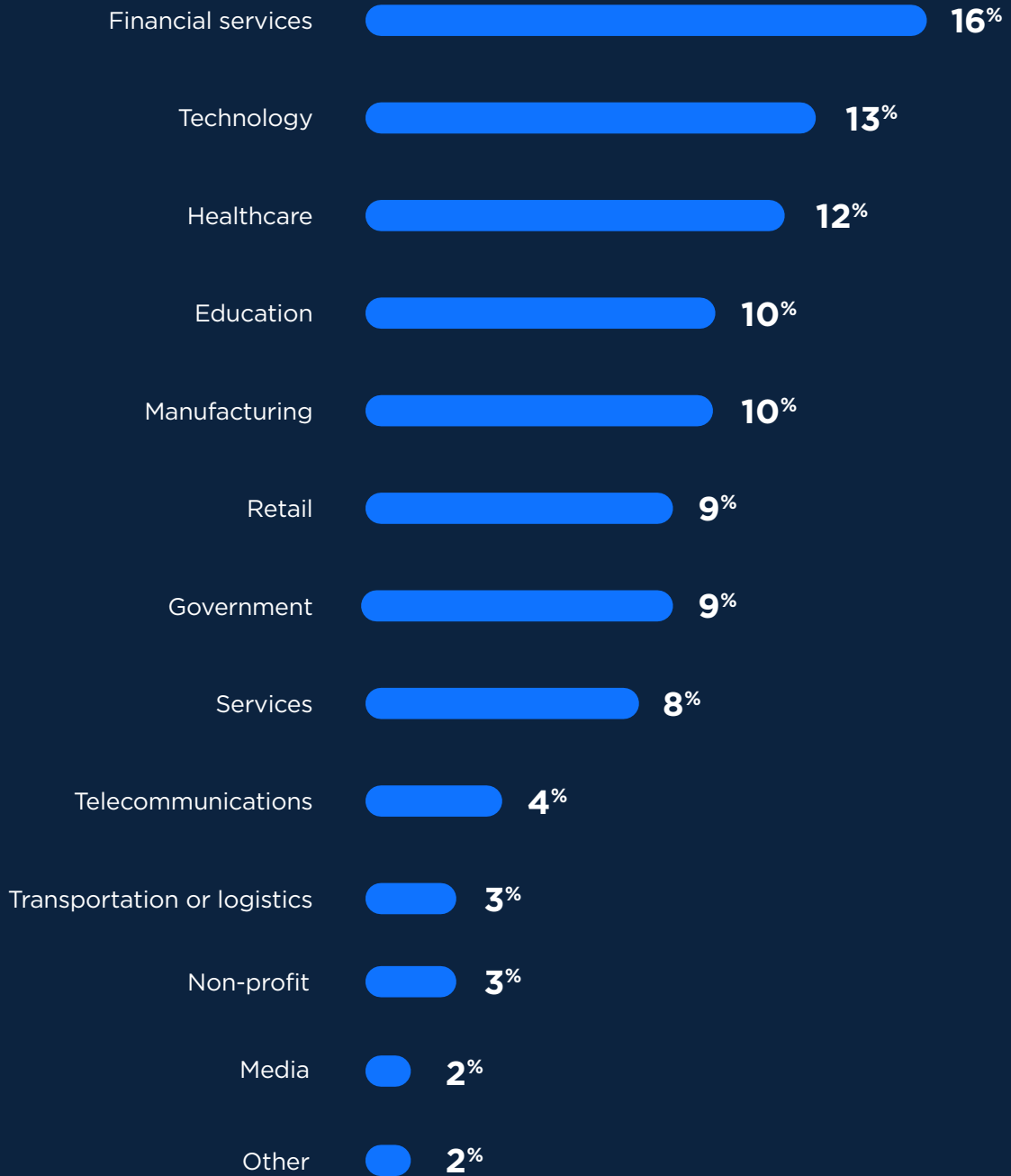
# Survey Methodology and Participant Demographics

In early 2021, an online survey was fielded to independent sources of cloud decision makers. The study was sponsored by CloudCheckr and conducted by Dimensional Research, an independent market research firm that specializes in enterprise technology. Certain questions were repeated from a similar 2017 and 2019 studies to enable trend analysis. Question options may add up to more than 100% because of rounding.

A total of 304 qualified individuals at a company with more than 500 employees completed the study. The study included both business roles and IT stakeholders. All had decision-making responsibility for public infrastructure cloud (IaaS) investments such as Amazon Web Services, Microsoft Azure, and Google Cloud at a company with a significant investment in IaaS. Participants represented a wide range of roles, company sizes, and job levels.



## Industry



# CloudCheckr

## About CloudCheckr

CloudCheckr gives organizations control of their cloud. The CloudCheckr CMx platform proactively analyzes cloud infrastructure to provide customers with visibility, intelligence and automation to better manage and reduce costs, make environments more secure and in compliance, and optimize resources in use. Enterprises, public sector organizations and managed service providers rely on CloudCheckr to help manage and govern \$4 billion in spend for their complex and sensitive cloud environments. For more information, visit [CloudCheckr.com](https://cloudcheckr.com), connect with CloudCheckr on [LinkedIn](#), or explore the [CloudCheckr Resource Center](#).

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