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# What Manufacturers Auditing Their Public Cloud Infrastructure Spending Have Uncovered: Industry Spotlight

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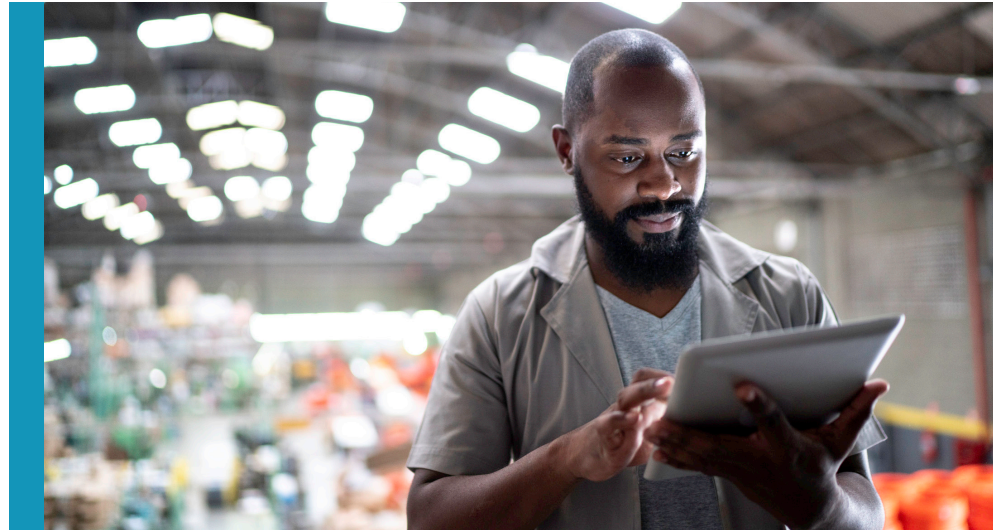
JULY 2022

**DELL**Technologies



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## RESEARCH OBJECTIVES AND METHODOLOGY

### OBJECTIVES

Manufacturing companies face challenges as they think about technology spending. On one hand, manufacturers tend to invest less (as a percentage of their revenue) on technology solutions than many other verticals. On the other hand, technology is frequently recognized as a business driver, with many manufacturers focusing on strategic investments in production technology and operational systems, like MES (Manufacturing Execution System), MOM (Manufacturing Operations Management) and EMI (Enterprise Manufacturing Intelligence) solutions. At the same time, information technology (IT) and operational technologies (OT), particularly legacy OT, often require significant integration to work well together, further sapping resources and creating complexity. With limited resources for investment and competing priorities, many organizations are continuously auditing their technology spending and have made changes to optimize investment as a result.

This eBook discusses new research conducted by ESG specific to the manufacturing industry. The research aimed to uncover trends in three areas:

**Understanding** manufacturers' use of public cloud infrastructure and its impact on IT complexity.

**Measuring** if and to what degree public cloud infrastructure spending is outpacing expectations in the manufacturing sector.

**Assessing** the forward-looking IT landscape trends among manufacturers as they balance IT costs and requirements.

The goal of this eBook is to give IT and business strategists in the manufacturing industry insights into their peers' public cloud infrastructure experiences and show how they are adapting IT strategies to best serve the needs of their businesses.

### RESEARCH METHODOLOGY

The data in this eBook is derived from a double-blind survey<sup>1</sup> of 198 technology decision makers (CIO/CTO/VP/directors of IT, 60%) and senior members of finance teams (CFO/VPs/directors of finance, 40%) at enterprise-class manufacturing companies. The survey was conducted in the first half of 2022 and was complimented by two hour-long interviews with cloud strategists at manufacturing companies. All respondents (both survey respondents and interviewees) were required to be knowledgeable about their organization's cloud infrastructure spending to qualify to participate.

Survey respondents were located across the US (45%), Canada (8%), the UK (16%), Germany (16%), and France (14%).





# HIGHLIGHTED FINDINGS

## Hybrid and multi-cloud approaches dominate in the manufacturing industry:



On average, manufacturing companies surveyed use

**3.1 DIFFERENT** infrastructure cloud service providers (CSPs) today.



But cloud usage drives IT complexity:

**65%** of respondents say complexity is on the rise.

**48%** of mission-critical applications run on-premises

**24%** are consumed as SaaS

**28%** run on public cloud infrastructure

## Manufacturers underestimate the cost implications of their public cloud usage:



**81%** of respondents have found that their actual public cloud infrastructure spending was higher than expected.



**88%** of respondents reported that their cloud cost audit uncovered **workloads placed in the cloud that definitively should not have been migrated or launched on public cloud infrastructure.**

On average, **manufacturing companies are spending 22% more per year on public cloud infrastructure than they thought they were prior to their public cloud cost audit.**

Respondents most often reported **cloud application/service costs, professional services tied to cloud migrations, networking costs, storage costs, and monitoring services costs** contributed to spending that exceeded expectations.

## Cloud cost audits drive organizational action:



**79%** invest in management tools that span on-premises and cloud environments to improve manageability, **driving 2.6 full time employees-worth of improved efficiency.**



**73%** **institute more cloud procurement controls** like centralized buying and additional approval processes.



**70%** report their findings helped spur broad data center modernization projects which **have helped drive a median of 15 workload repatriations to drive savings.**

A man with dark curly hair and a beard, wearing a blue long-sleeved work uniform and blue and white patterned gloves, is focused on his work. He is standing in a large industrial factory, leaning over a large, dark, metallic machine. The machine has a series of rectangular components arranged in a row. The background shows the complex structure of the factory with various pipes, beams, and equipment. The lighting is bright, typical of an industrial environment. The overall scene conveys a sense of precision and manual labor in a manufacturing setting.

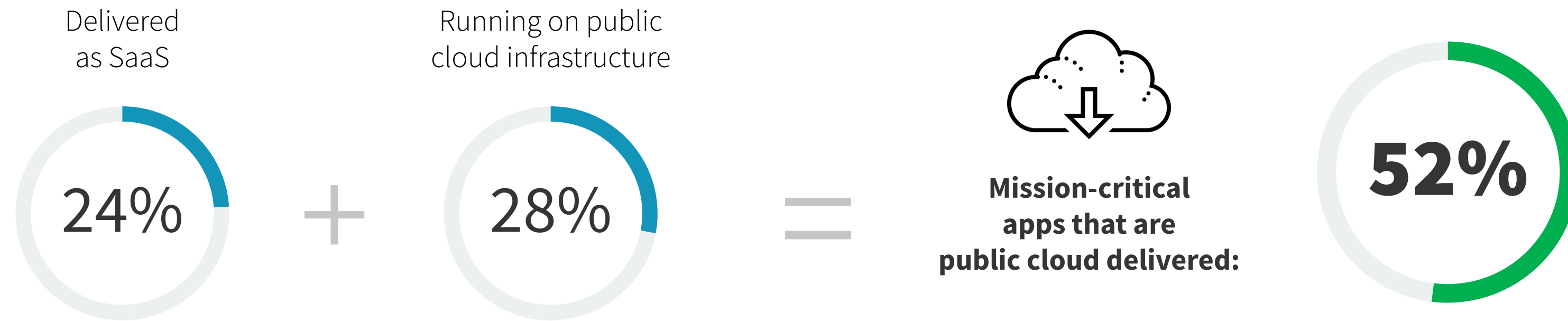
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# Public Cloud Infrastructure Usage and Trends in the Manufacturing Sector



# Manufacturers have a hybrid approach to running mission-critical applications

| The average percentage of mission-critical applications hosted on-premises, in the public cloud, and at the edge today.



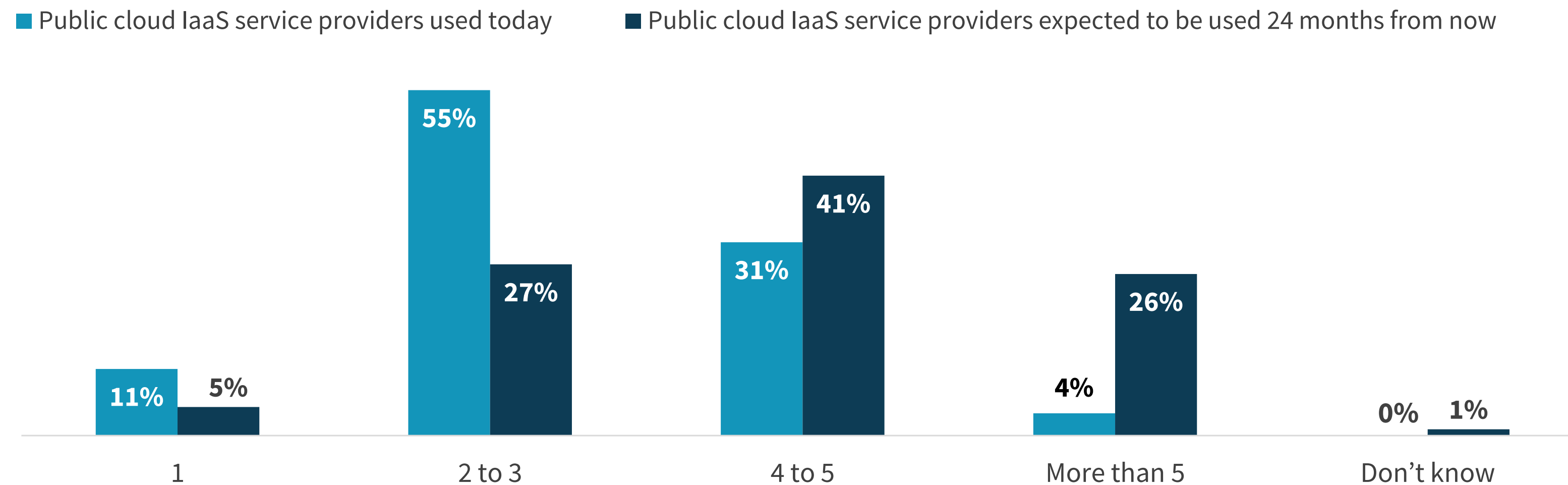
Past ESG research has discussed that many organizations are taking a hybrid and multi-cloud approach to IT service delivery today. However, to date, ESG’s data has been horizontal in nature, aggregating all private- and public-sector organizations together.

This research has allowed ESG to understand if this trend extends to manufacturers. As shown, hybrid approaches to mission-critical application delivery are common among manufacturing organizations. This could encompass applications like material requirements planning, product lifecycle management, inventory management, and others. On average, IT respondents in the survey reported 24% of their mission-critical applications are consumed as SaaS, 28% run on public cloud infrastructure, 21% run at the edge (e.g., distributed production facilities), and 27% run in a centralized data center, private cloud, or colocation facility.

In the aggregate, about half of these key workloads run on-premises and half run in the public cloud. Complementary ESG research shows organizations are broadly adopting a “hybrid forever” mindset. Three years from now, organizations still anticipate splitting their business-critical applications evenly across on-premises and off-premises environments.<sup>1</sup>

# While hybrid approaches dominate, public cloud IaaS usage is in flux

| The number of public cloud IaaS providers in use: today versus expectations 24 months from now.



“When ESG asked IT respondents how many different public cloud IaaS providers they use today, **89% reported more than one.**”

On average, a meaningful 28% of manufacturers' mission-critical applications run on public cloud IaaS today. And while that percentage may not be expected to significantly shift over time, the number of IaaS cloud service providers (CSPs) partnered with over time is poised to increase.

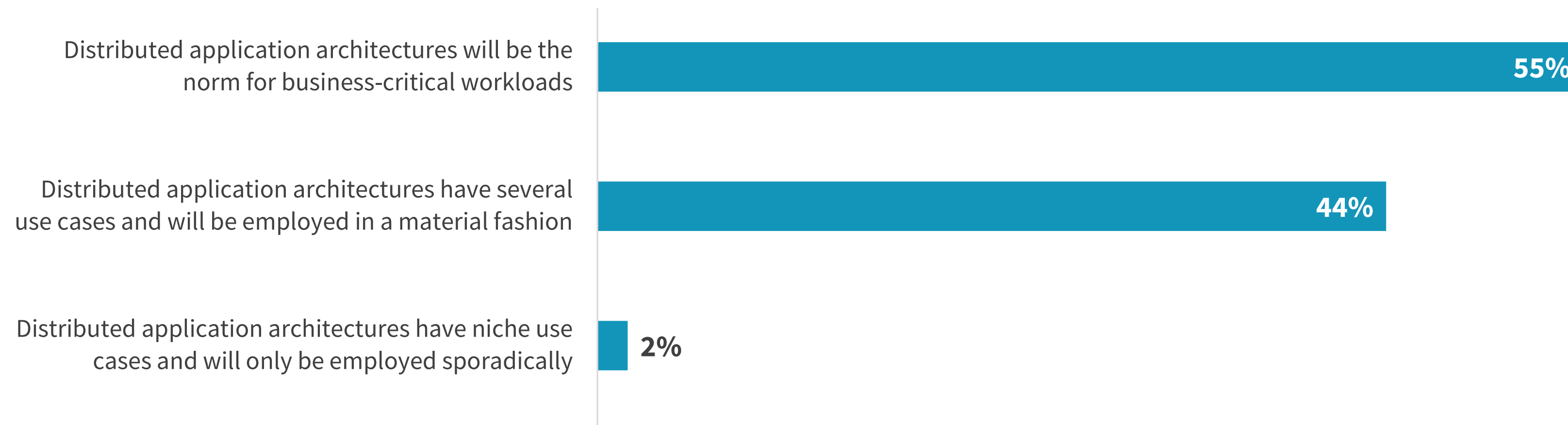
When ESG asked IT respondents how many different public cloud IaaS providers they use today, 89% reported more than one. This validates that manufacturing companies are indeed following a multi-cloud IT strategy today.

However, public cloud IaaS diversification is poised to increase significantly over the next 24 months: While 35% reported using four or more IaaS CSPs today, 67% expect to do so 24 months from now.

Said another way, on average, manufacturing companies surveyed use 3.1 different IaaS CSPs today but expect that to increase to 4.3 IaaS CSPs over the next two years.

# Distributed applications are poised to disrupt the cloud status quo

| Will distributed applications make inroads into the manufacturing industry over the next 24 months?



“It’s been challenging, but the future growth of our company is tied to cloud-native development.”

- Chief Enterprise Architect & Strategist, Manufacturing company with more than 20,000 employees

To date, while many organizations operate in a hybrid and multi-cloud manner, their workloads have tended to be mostly self-contained; the entire workload—infrastructure, database, web front end, etc.—tends to reside in a single environment.

As technologies like containers, and improvements in their orchestration, enable a shift toward microservices-based architectures and cloud-native development models, organizations are able to break down workloads into their component parts, running each component in the environment best suited for it.

The research delved into seeing if manufacturing companies are exploring these distributed applications.<sup>2</sup> As the data shows, 55% of respondents say distributed applications will become the norm in the manufacturing industry, while 44% say distributed applications will be used in a material fashion.

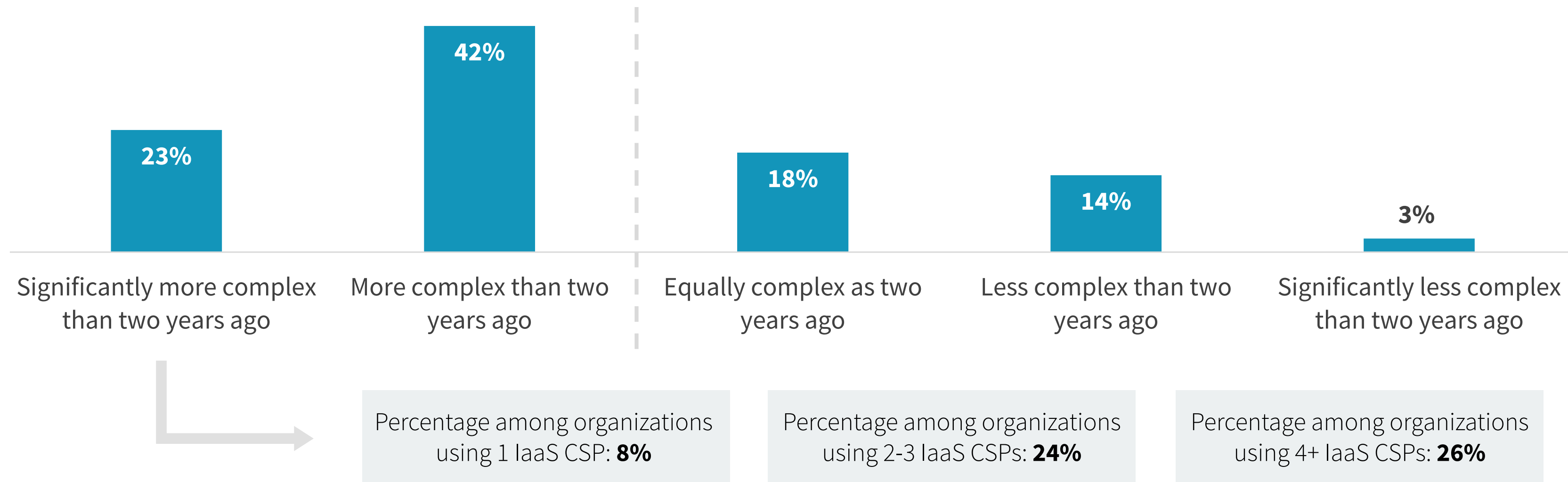
This shift in architectural approach may be a driving force behind the uptick in the number of public cloud CSPs expected to be in use over the next 24 months and adds another layer of complexity for IT organizations navigating hybrid and multi-cloud IT realities.

<sup>2</sup> Distributed applications are a type of application where the data, infrastructure, and microservices combine to provide application functionality that spans multiple cloud environments.



# IT complexity is ratcheting up, driven in part by multi-cloud fragmentation

| The level of IT complexity today versus 24 months ago.



While more changes are on the horizon for IT with respect to the number of IaaS CSPs in use today and the adoption of distributed application architectures, when we asked respondents to look backward, it was clear that the past few years have brought significant changes as well.

When asked how the state of IT complexity today compares to two years ago, 65% of respondents at manufacturing organizations reported an increase in complexity, nearly 4x the rate of respondents reporting that complexity had been reduced.

The data also shows a correlation between significant increases in complexity and the number of public cloud IaaS providers in use. As organizations bring more public cloud IaaS providers into their environment, they tend to see greater increases in IT management complexity.

Among respondents at organizations using 1 public cloud IaaS CSP, only 8% reported a significant uptick in complexity, 24% of those organizations using 2-3 CSPs today reported a significant uptick, and 26% of those at organizations using 4+ CSPs today reported the same.

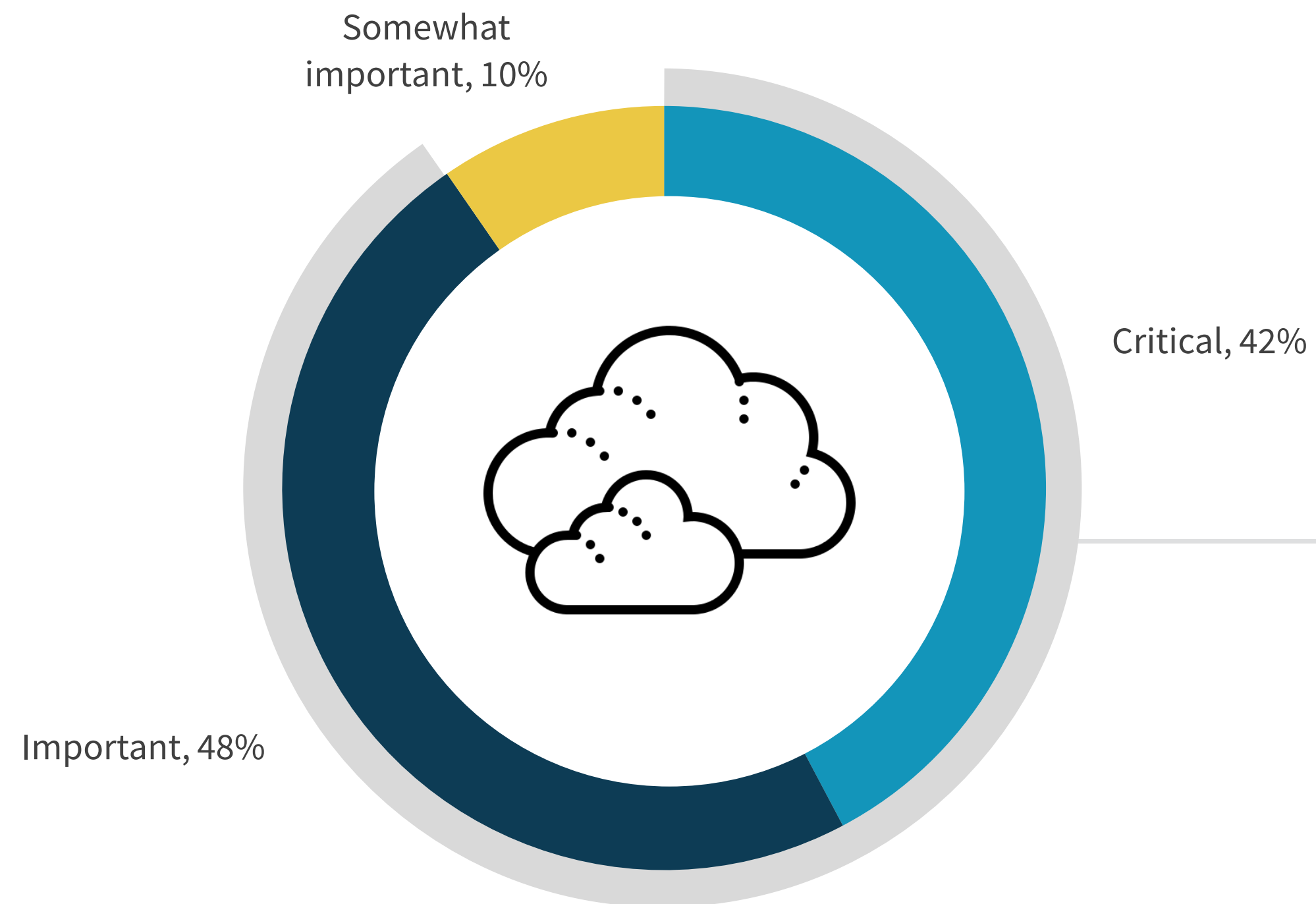
“There are so many cloud services available, **you need an encyclopedia to navigate it, let alone optimize it.**”

- VP of IT and process improvement, Manufacturing company with more than 900 employees



# Solving for effective multi-cloud management is mission-critical in its importance

| The importance of continuously improving IT's ability manage multi-cloud environments to meet long-term business and technology goals.



“90% of respondents in the manufacturing sector **said this improvement was important or critical.**”

Solving the complexity problems introduced by multi-cloud IT operations is essential. ESG asked respondents how important it is to their businesses' long-term goals that they continuously improve their ability to manage a multi-cloud environment. In total, 90% of respondents in the manufacturing sector said this improvement was important or critical.

And it is significant to note that this importance extends beyond IT goals like infrastructure flexibility, scaling agility, or a reduction in capital expenditures. The importance respondents ascribe to effective multi-cloud management includes both long-term business goals like time to market and revenue or profitability considerations (in addition to technology goals).



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# Public Cloud Infrastructure Spending Audits: What Surveyed Manufacturing Companies Have Uncovered



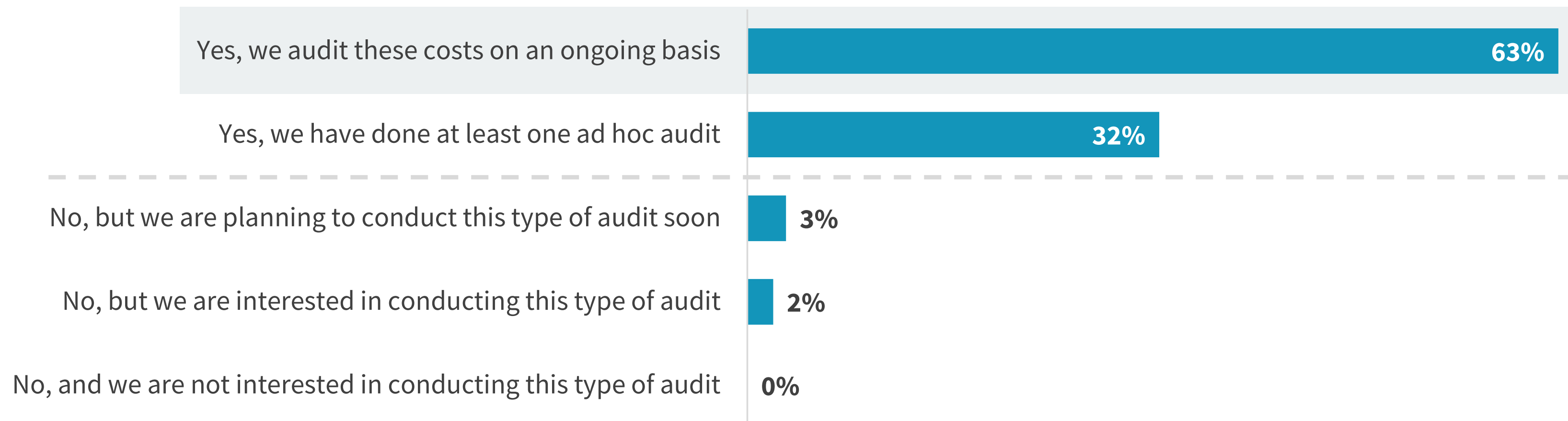


# Manufacturers are closely monitoring public cloud infrastructure spending

Those auditing cloud infrastructure costs on an ongoing basis outnumber those not auditing by

**13:1**

Has your organization conducted a thorough audit of public cloud infrastructure spending (e.g., egress costs, storage costs, compute costs, adjacent monitoring and management services, API costs, etc.) in the last 24 months?



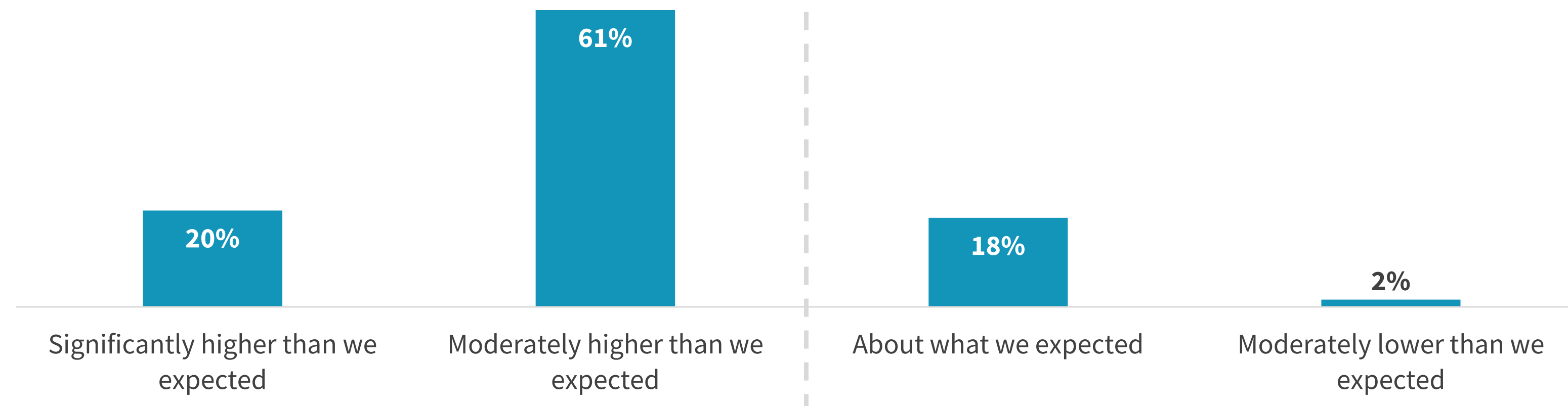
Before delving into what public cloud infrastructure audits reveal, it is instructive to note that nearly all manufacturing companies we surveyed are paying close attention to their public cloud infrastructure costs: 95% of respondents surveyed reported their organization had conducted a thorough audit of all costs across the business in the last 24 months. In fact, the majority of organizations (63%) report auditing these costs on an ongoing basis. Organizations without a clear picture of these costs trail their peers.

As for why organizations are paying such close attention to these costs, the reasons were multifaceted: 65% reported the discovery of one or more redundant investments prompting further inspection, 50% reported that they knew spending was high but needed to develop a more formalized understanding, and 44% of respondents reported a surprise overrun or inaccurate forecasting led to more due diligence.

**95%**  
of respondents surveyed reported their organization had conducted a thorough audit of all costs across the business in the last 24 months.

# Manufacturing companies find actual cloud spending exceeds their estimates

After your organization conducted its audit, did you find actual public cloud infrastructure spending was higher or lower than expected?



“Costs surprisingly went from \$3 to \$4 million, and that created a lot of intrigue. **We recognize we have lost control of costs and realize we need to rein that in.**”

- Chief Enterprise Architect & Strategist, Manufacturing company with more than 20,000 employees

On average, manufacturing organizations report actual public cloud spending was

**22% HIGHER**  
than expected prior to the audit.

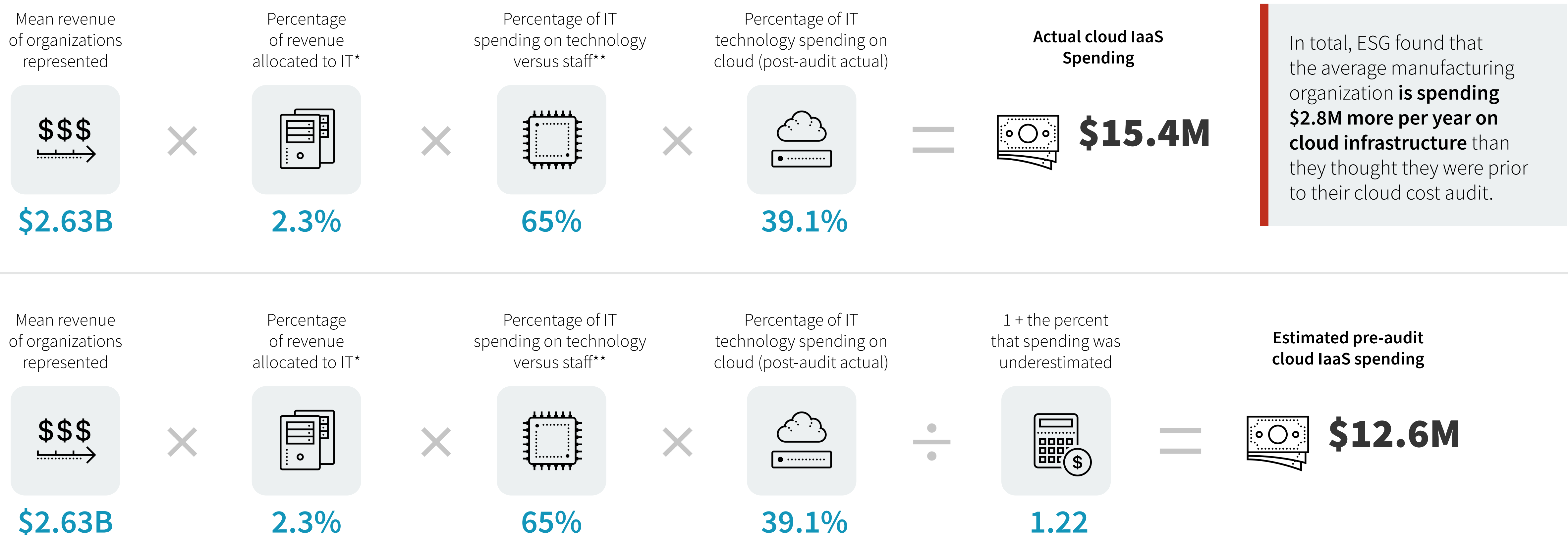
Among manufacturing companies that have audited their public cloud infrastructure spending, most have found they were underestimating their costs: 81% of respondents said that actual spending was higher than they expected compared to 18% of organizations that estimated costs accurately and just 2% that found they were actually overestimating their cloud spending.

In precise terms, on average, manufacturing organizations found that actual public cloud spending was 22% higher than expected prior to the audit.



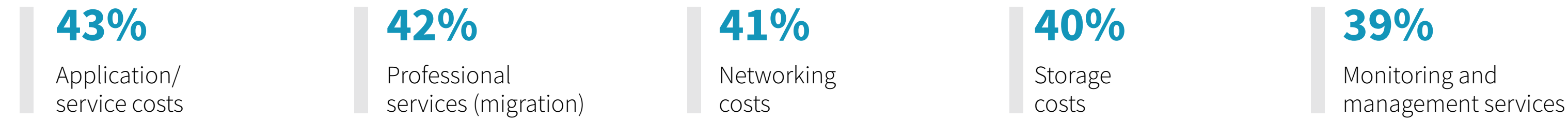
# What does a 22% undercounting of cost look like? Manufacturing companies surveyed spending ~\$2.8M more than they thought.

To model the magnitude of public cloud spending overruns among manufacturers, ESG looked at the average revenue of organizations participating, the typical allocation of revenue to IT spending, the percentage of IT budget that typically is allocated to IT technology (versus staff costs), and the actual proportion of IT budgets determined to be allocated to cloud infrastructure post audit.

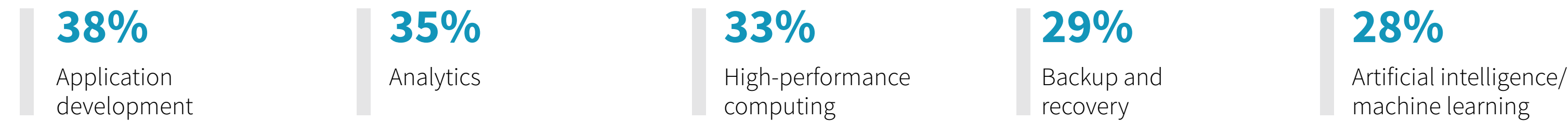


# What drives cloud cost overages?

Categories of costs that contributed to actual public cloud costs being higher than expectations among manufacturing companies.



Workloads that contributed to actual public cloud costs being higher than expectations among manufacturing companies.



“ We had an instance where there was an issue with our software that resulted in telemetry devices sending data to the cloud too frequently, **which caused a network bill that was literally 100x our typical monthly cost.**”

- VP of IT and process improvement, Manufacturing company with more than 900 employees

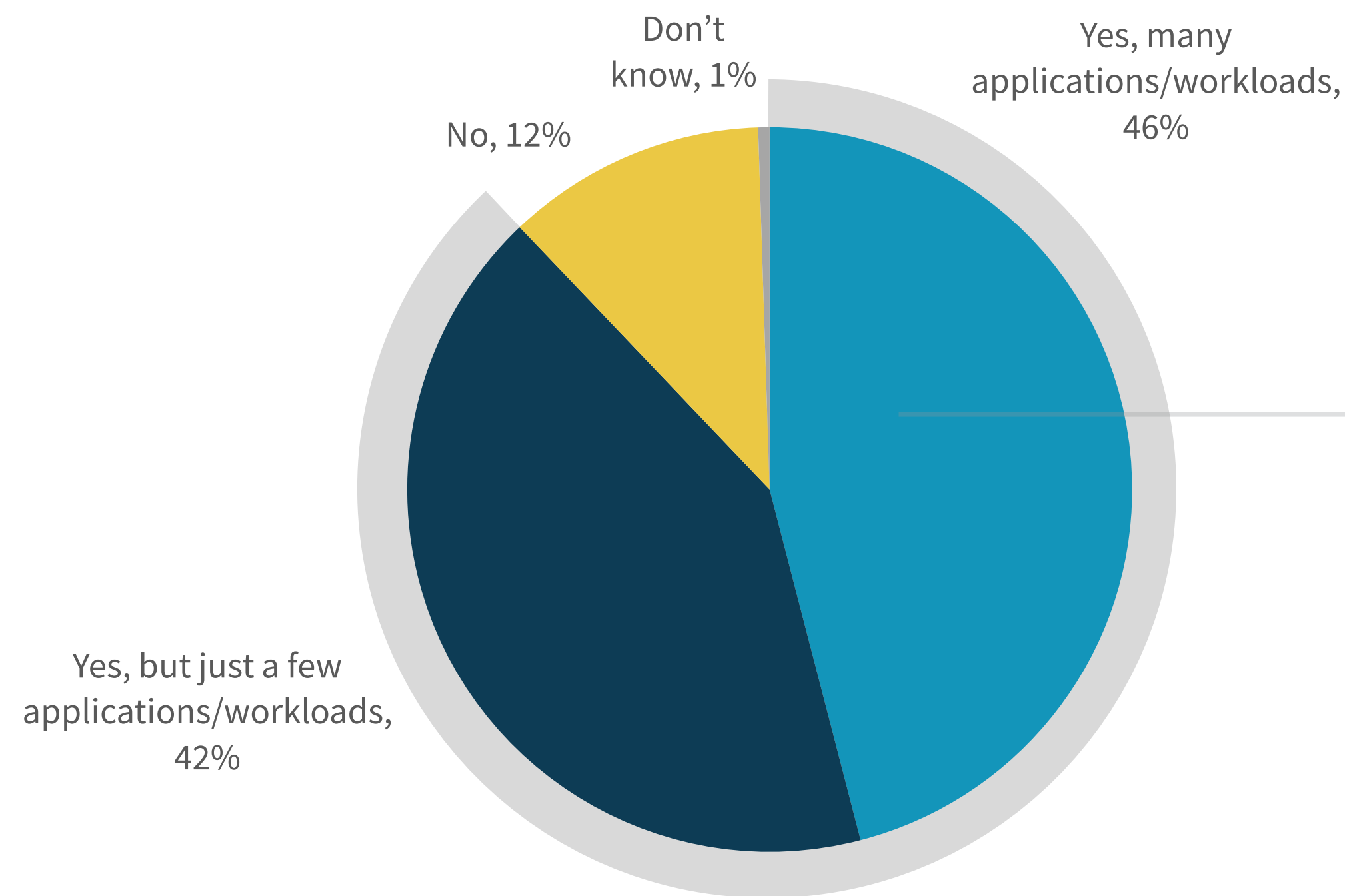
After conducting their public cloud cost audit and comparing actual spending to expectations, organizations achieve clarity into where and why their expectations deviated from reality. ESG research delved into two aspects of this deviation:

- 1. The cloud services that most drove overages.** Respondents in the manufacturing industry often reported that cloud application/service costs, professional services tied to cloud migrations, networking costs, storage costs, and monitoring services costs each contributed to cloud spending that exceeded expectations.
- 2. The workloads most responsible for cloud cost overruns.** In this area, respondents often reported that workloads like application development and home-grown solutions, analytics and high-performance computing projects (e.g., production yield monitoring, supply chain management, quality assurance analytics), data backup and recovery, and AI/ML workloads were behind cost overruns.



# Many organizations discover workloads in the cloud that shouldn't be run there

Did your organization's cloud cost audit uncover any workloads running in the cloud that definitively should not be run on public cloud infrastructure?



“88% of respondents reported that their cloud cost audit uncovered **workloads placed in the cloud that definitively should not have been migrated or launched on cloud infrastructure.**”

ESG has often anecdotally heard of scenarios where organizations adopting a “cloud-first” strategy for application hosting may find that those strategies lead to misalignment between workload requirements and cloud infrastructure capabilities.

In this study, we explored if this trend is common in the manufacturing sector, and 88% of respondents reported that their cloud cost audit uncovered workloads placed in the cloud that definitively should not have been migrated or launched on cloud infrastructure.

Why? Most often, respondents reported issues with performance (e.g., latency) (48%), wild cost fluctuations (41%), and difficulty implementing security measures (36%).

While security is a cross-industry concern, the first two items make sense in the context of manufacturing operations.

For example, using public cloud infrastructure at a production facility leveraging imaging or real-time data for quality assurance (or other analysis) may be problematic as latency can introduce bottlenecks that limit production yields.

Similarly, a rapid spike in demand could scale the amount of data transmitted and stored to such a degree that the economic profile of the application is no longer suited for the public cloud.

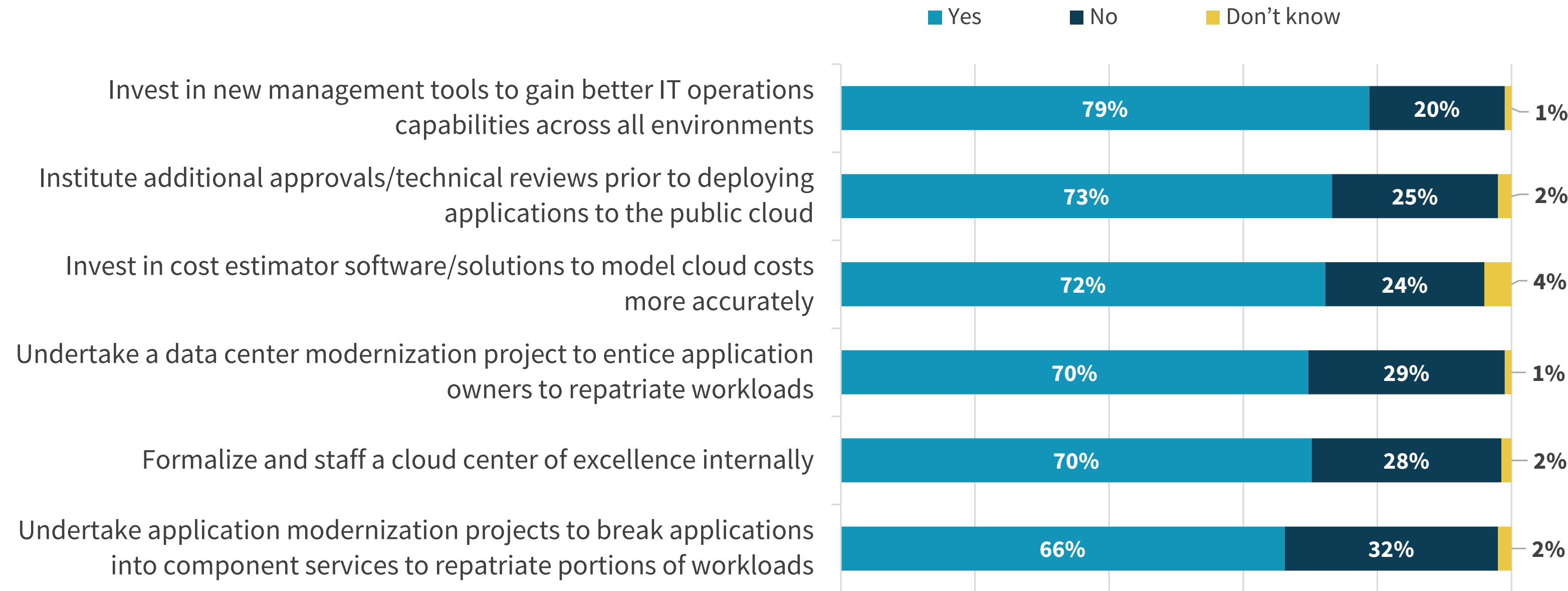
A photograph of two men in an office setting. The man on the left is older, with grey hair and a beard, wearing a yellow sweater and glasses. The man on the right is younger, with dark hair and a beard, wearing a light blue button-down shirt and glasses. They are both looking at a laptop screen on a desk. The background shows office shelves with various items. The text is overlaid on the left side of the image.

**Public Cloud Audit Actions:**  
**What Organizations Do**  
**After They Audit Cloud**  
**Infrastructure Costs**



# Cloud cost audits are spurring action

Did your organization take any of the following actions as a result of learnings from its cloud cost audit?



“ In the cloud, one-off PoCs and self-service buying leads to sprawl and, you need a centralized procurement and approval organization. **We don't allow cloud costs to be expensed to force transactions through our centralized buying function.**”

- VP of IT and process improvement, Manufacturing company with more than 900 employees

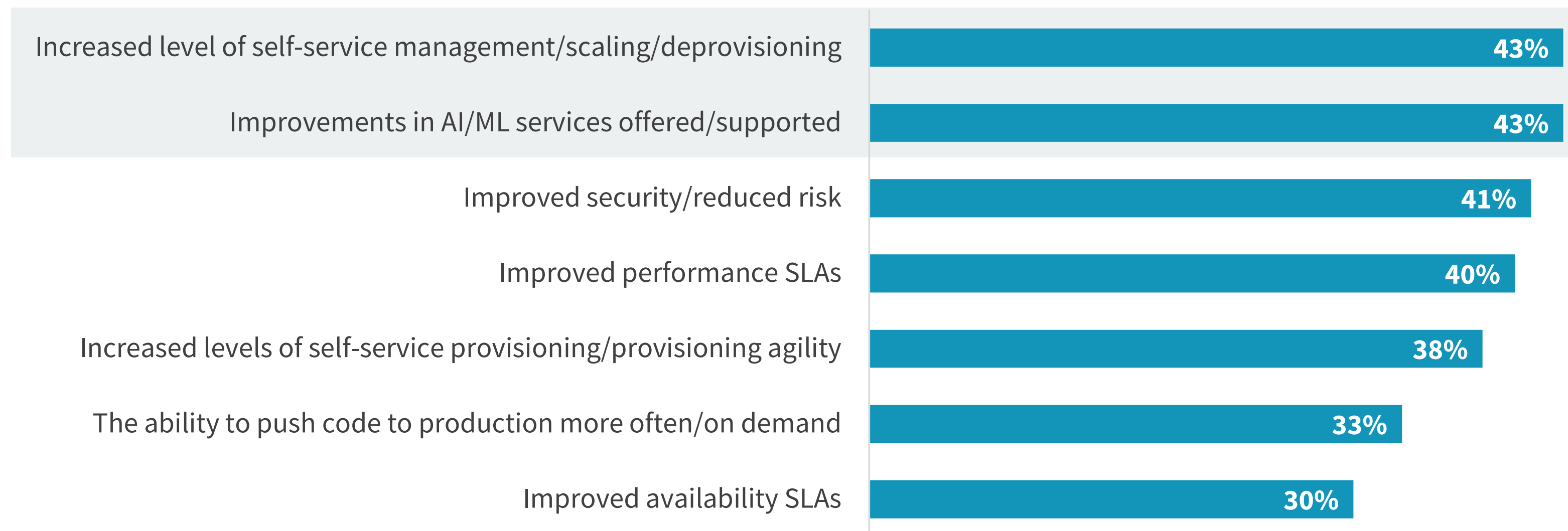
ESG research went beyond what manufacturing companies auditing their cloud spending have found to explore to what they plan to do next. The research shows that organizations aggressively act on their findings, and many invest in technology to help resolve the issue:

Many (79%) invest in management tools that span on-premises and cloud environments to improve administrator visibility and allow for better, more holistic infrastructure management. Similarly, 72% report new investments in cloud cost estimator software to improve cost forecasting, and 70% report their findings helped spur broad data center modernization projects to motivate application repatriation.

Additionally, many respondents reported their organizations had instituted new processes like adding new approvals and technical reviews (73%) to improve decisioning or staffing a cloud center of excellence (70%) to improve workload placement decisioning.

# The private cloud capabilities that drive workload repatriation

| What improvements tied to data center modernization have had the biggest impact driving workload repatriation?



“ Respondents reported having repatriated a median of 15 formerly cloud-hosted workloads. **However, the mean number of workloads repatriated was 45.**”

For organizations that had initiated a data center modernization project after their cloud audit, the research explored how successful those initiatives had been.

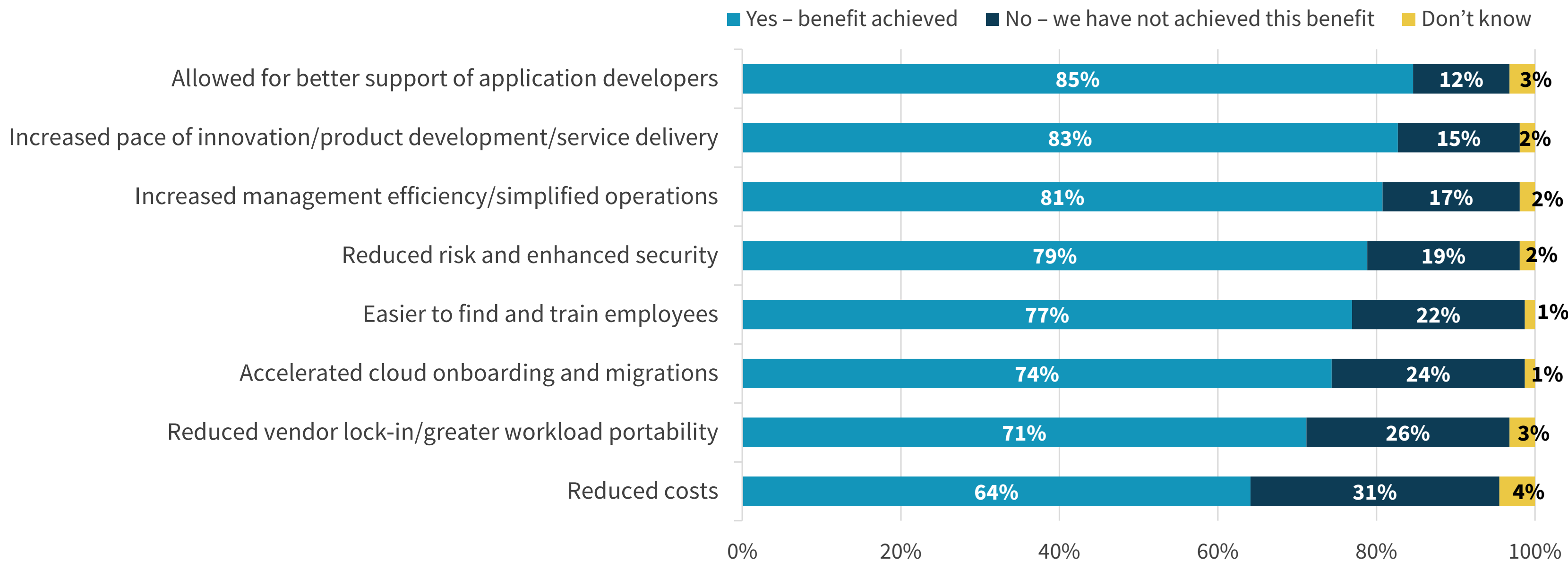
In the aggregate, respondents reported having repatriated a median of 15 formerly cloud-hosted workloads. However, the mean number of workloads repatriated was 45. This means that success was uneven; while some organizations had repatriated many workloads, others had repatriated only a few.

For manufacturers, modernization efforts that increase self-service infrastructure management and drive improvements in AI/ML capabilities were reported to have the biggest impact on workload repatriations, though impacts to security, performance, and self-service provisioning were also cited by a large proportion of respondents.



# A consistent infrastructure management experience drives significant benefits

Benefits achieved due to the adoption of management tools that improved management experience across clouds.



“Improvements to innovation rose to the top of the list, with **85%** reporting an improved ability to service application development stakeholders.”

For organizations that ramped investment in multi-cloud management tools after their cloud audit, the research explored the impact of those investments.

Thematically, improvements to innovation rose to the top of the list, with 85% reporting an improved ability to service application development stakeholders and 83% reporting a measurable uptick in product development timelines.

Additionally, several benefits to the IT organization were noted, including increased management efficiency (81%), ease of training (77%), and accelerated migrations (74%). ]

And when respondents were asked to estimate the improved efficiency impact on the IT organization, they reported saving the equivalent of 2.6 full-time equivalents (FTEs) due to infrastructure management improvements.



## The Bigger Truth

It's clear that manufacturing organizations, much like other industries, have adopted a hybrid and multi-cloud IT philosophy. However, this research shows that many organizations struggle with implementing this strategy in an economically efficient manner and without making workload placement missteps. As a result, ESG research shows that many organizations are working to rein in costs and transform their on-premises environment to both entice repatriations and simplify IT management burdens. Organizations grappling with or questioning if their current cloud usage is optimized would be well-served to carefully audit their public cloud infrastructure usage and follow the lead of their peers, if appropriate, by modernizing their private cloud capabilities and investing in solutions that can provide a more consistent management experience.

## How Dell Technologies can help

Dell Technologies helps organizations simplify multicloud by design. Dell APEX bridges the divide between the agility of public cloud and the control of private cloud, offering a truly unified cloud experience that's more consistent across all environments.

APEX brings simplified cloud experiences – with quick provisioning, seamless scaling, and flexible consumption – wherever applications and data live. Customers can subscribe to Dell's innovative technologies, consume them as-a-Service, and deploy them wherever needed, including public cloud and on-premises environments.

The APEX portfolio consists of cloud services and custom solutions that satisfy a range of requirements from compute to data storage to data protection with cyber resiliency and more.

APEX makes it easier to get more value from Dell Technologies innovation. Customers can simplify operations, increase agility to capture new opportunities, and maintain control of data – to minimize risk and maximize performance – on their terms.

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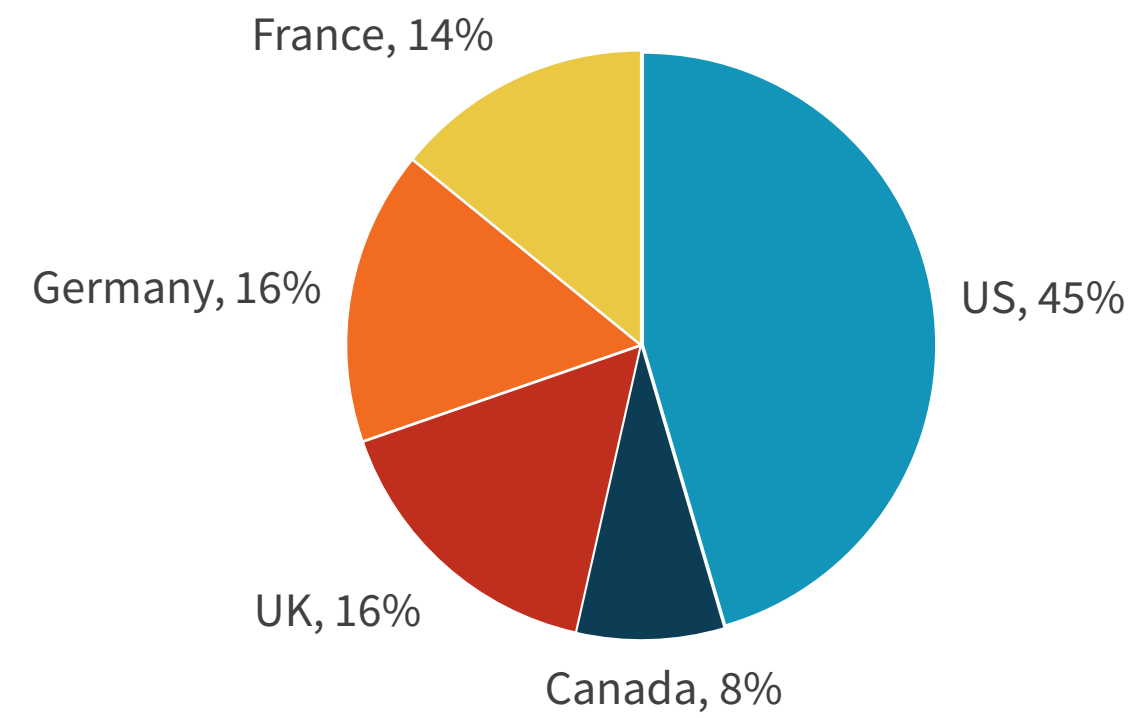
## Research Methodology

The data in this report was derived from a survey fielded among IT and finance leaders in the manufacturing industry in March of 2022. These figures detail the demographics of respondents to the survey located in North America (N=106) and Western Europe (N=92).

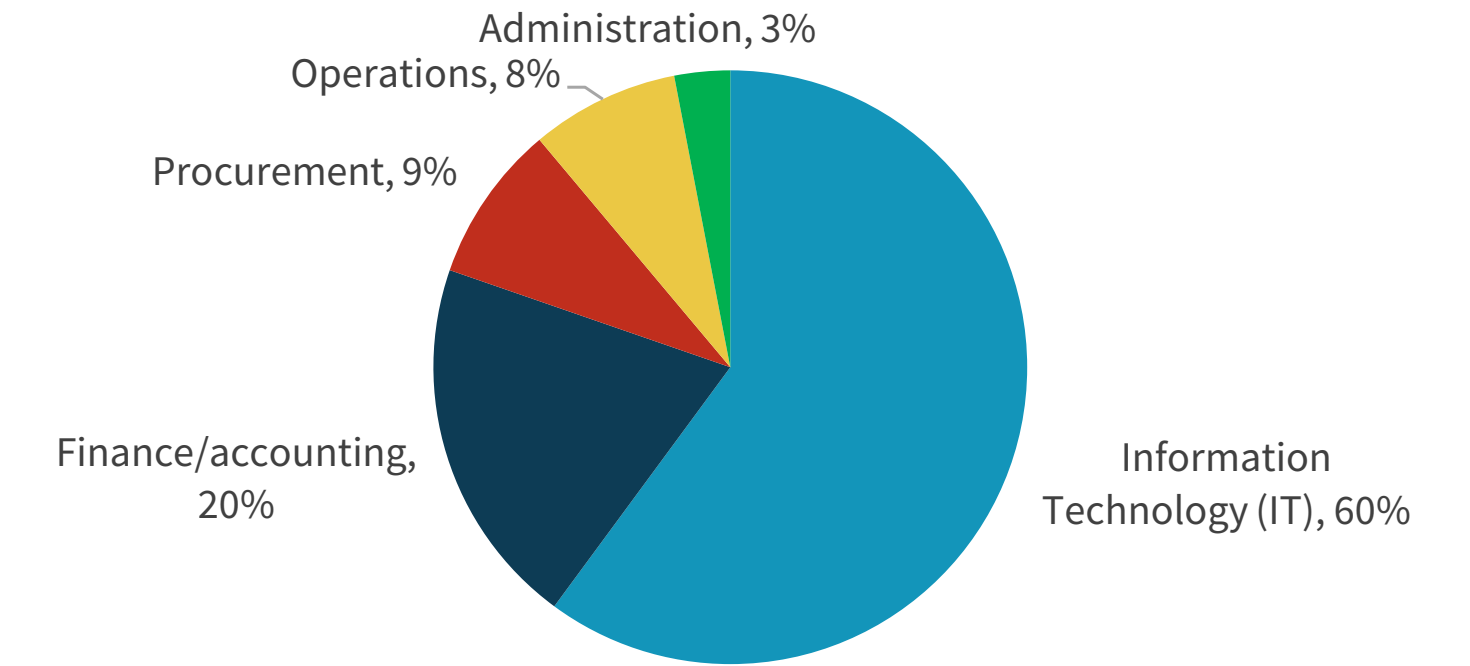
Totals in figures and tables throughout this report may not add up to 100% due to rounding.

The margin of error for a sample size of 198 at the 95% confidence level is + or - 7 percentage points.

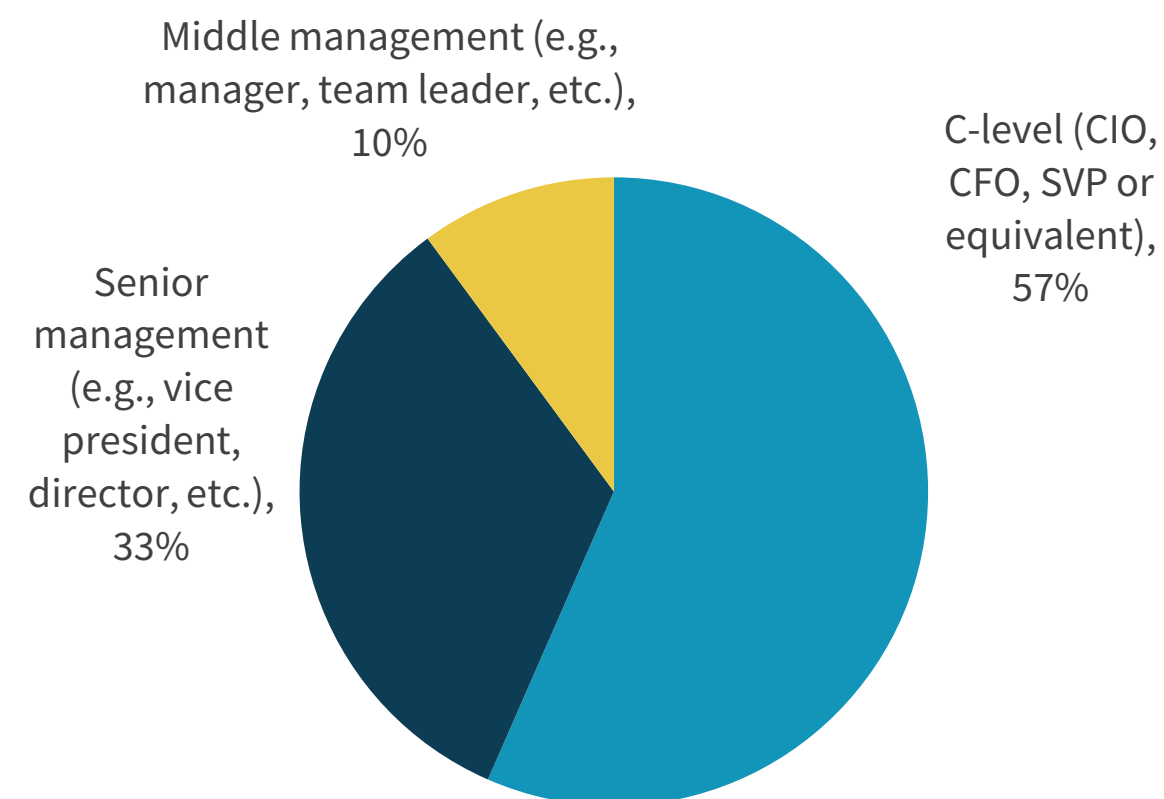
**RESPONDENTS BY COUNTRY.**



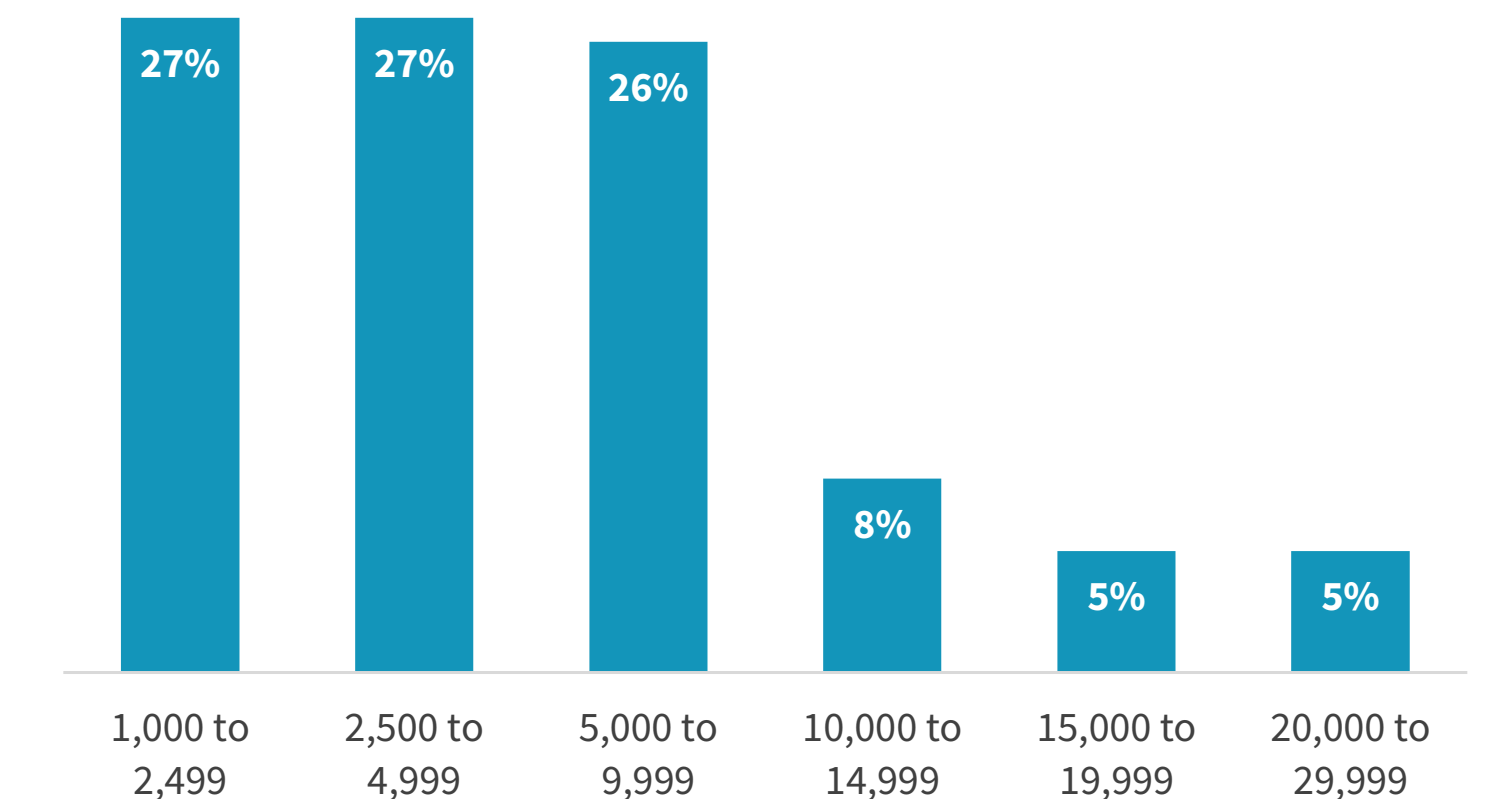
**RESPONDENTS BY JOB FUNCTION.**



**RESPONDENTS BY ROLE.**



**RESPONDENTS BY COMPANY SIZE.**







# DELL Technologies

## ABOUT DELL TECHNOLOGIES

Technology has never been more important than in today’s data-driven era, and Dell believes it is an overwhelming force for good. We’re committed to helping safeguard technology’s role in human progress by helping you plan, prepare, and protect against attacks so you can build your breakthrough with confidence.



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