PULSE SURVEY

Accelerating Forward:

The State of Cloud-Driven Transformation

Cloud transformation is one of the single-most-powerful opportunities for driving the global economy forward. As technology and security leaders continue expanding their roles in driving and supporting business strategy, the cloud is empowering organizations worldwide to ignite innovation, increase agility, and catalyze disruption at a rapid pace—and it's only gaining momentum.

Last year, we kicked off an annual, research-led deep dive in collaboration with Harvard Business Review Analytic Services to understand how organizations were leveraging the cloud to navigate uncertainty, enable distributed workforces, and meet the surging demand for digital experiences. This year's research reveals how organizations are now optimizing their cloud transformations to continue unlocking innovation.

There's one thing that's clear: Unleashing the power of cloud has never been more urgent, with 67% of senior executives surveyed saying their organization has accelerated its plans for cloud adoption, up from just over half the year before. On top of that, organizations have doubled down on net-new cloud investments, with over half increasing their spend, compared to just under a third in 2020.

While organizations are harnessing the power of the cloud to improve business outcomes, they are still struggling with the complexities introduced by a hybrid cloud environment. And of those with a hybrid cloud environment, 88% cite that they'll maintain this strategy for the foreseeable future.

In working with thousands of organizations across sectors and regions, we at Splunk know that a strong data foundation is key to overcoming complexity and unlocking innovation in this new hybrid world. Splunk's scalable data platform supports customers in accelerating their cloud-driven transformations by providing full-stack observability and unified security across complex hybrid and multi-cloud environments.

Over the course of my career, I have seen cloud transformation go beyond the technology itself to fundamentally change how organizations operate, from how talent is hired to how financial decisions are made to how teams collaborate.

This next wave of innovation will be enabled by cloud but powered by data—and demand for data has never been greater. That reality is what energizes us as we help customers be more secure, resilient, and innovative through data and cloud-driven transformation.

I hope this report gives you insights into how your peers are progressing and how you can optimize your own cloud transformation to move faster, go further, and achieve success today and tomorrow.

Teresa Carlson
President & Chief Growth Officer
Splunk

Accelerating Forward:
The State of Cloud-Driven Transformation

While the early months of the Covid-19 pandemic lit a fire under organizations' plans for cloud adoption and implementation, the past year has poured fuel on those flames. "The pandemic has been the biggest single accelerant to cloud adoption that we've ever seen," explains Dion Hinchcliffe, vice president and principal analyst at Constellation Research, a technology research and advisory firm based in Cupertino, Calif.

Amid the global volatility and uncertainty of the past two years, one thing has become clear: Cloud is integral to business success in the digital age. An October 2021 survey by Harvard Business Review Analytic Services of 300 respondents familiar with their organization's cloud strategy and adoption confirms this point. The vast majority of respondents (81%) say that cloud is very or extremely important to their organization's future strategy and growth.

"It's a positive trend," says Yugal Joshi, partner at Dallas, Texas-based strategic IT consultancy and research firm Everest Group. "Cloud is no longer just a technology; it's an operating model for the enterprise. That is reflected by the growth and acceleration of cloud adoption."

Indeed, survey respondents paint a picture of an even greater acceleration and expansion of cloud implementations over the past year than respondents did in the previous year's Harvard Business Review Analytic Services cloud survey (a year during which many organizations had to migrate to or adopt cloud services overnight). These organizations continue to look to the cloud to support and enable greater business agility, cost reduction, data analytics capabilities, and accelerated innovation.

However, the rapid acceleration and expansion of cloud has brought its own challenges—not only in terms of integration and management, but also with regards to new cybersecurity, data privacy, ROI measurement, and cloud talent

HIGHLIGHTS

81% of survey respondents say that **cloud is very or extremely important to their organization's future strategy** and growth

67% say their organization has **accelerated the adoption or implementation of already planned cloud applications**, services, or infrastructure during the past 12 months

62% agree that their organization is **having difficulty keeping up with the rapidly evolving technology roles and responsibilities** required to manage its increased cloud adoption

Due to rounding, some figures in this report may not add up to 100%.

> "The pandemic has been the biggest single accelerant to cloud adoption that we've ever seen," explains Dion Hinchcliffe, vice president and principal analyst at Constellation Research.

concerns. With most respondents leveraging cloud in addition to their on-premises systems—and anticipating maintaining such a hybrid cloud infrastructure for the foreseeable future— the difficulties of managing these complex environments effectively are evident.

As a result, organizations have yet to fully capitalize on the value of cloud. Even as respondents sped up or increased the percentage of workloads in the cloud in the near future, there remains a need for their organizations to improve and streamline the ways that they measure, manage, and secure their growing portfolios of data, services, and systems.

These findings underscore the critical role that effective data accessibility and use strategies for cloud management play in enabling business transformation. The following report explores the state of cloud-enabled transformation, including the continued (and hastened) expansion of cloud in the enterprise and the drivers of that growth. It lays out

FIGURE 1

Cloud's Continued Ascent

Even more respondents have sped up or are increasing their cloud adoption in 2021.

2021: In which of the following ways has your organization accelerated or altered its cloud adoption plans over the past 12 months, if at all?
[SELECT ALL THAT APPLY]

2020: In which of the following ways has the Covid-19 pandemic accelerated or altered your organization's cloud adoption plans, if at all?
[SELECT ALL THAT APPLY]

■ 2020   ▨ 2021

56%	
67%	

Accelerated adoption/implementation of already planned cloud applications, services, and/or infrastructure

32	
53	

Increased investment in net new cloud applications, services, and/or infrastructure

28	
41	

Focused on new or different use cases for cloud

Source: Harvard Business Review Analytic Services survey, October 2021

challenges that the acceleration and expansion of cloud have created and what organizations are doing to surmount them, discusses where cloud is delivering results and where it is falling short, and identifies why cloud optimization and better data strategies are the order of the day.

Cloud on the Fast(er) Track

In the first year of the Covid-19 crisis, cloud emerged as the key solution to many organizational challenges, from the need to support dispersed employees working from home to demands for new digital customer capabilities.

According to survey results, the march to cloud continued throughout 2020. In fact, a solid majority of organizations have further accelerated and expanded their cloud adoption and implementation over the past year.

More than two-thirds (67%) of respondents say their organization has accelerated the adoption or implementation of already planned cloud applications, services, or infrastructure during the previous 12 months, an increase from the 56% who said their organization had done this as a result of the Covid-19 pandemic in the prior year's survey. **FIGURE 1** More than half (53%) say their organization increased investment in net-new cloud applications, services, or infrastructure over the past year, up from 32% who said this was the case as a result of the pandemic last year. And four in 10 (41%) say their organization has focused on new or different use cases for cloud over the last year, a jump from the 28% who reported doing so as a result of the pandemic in 2021.

Some cloud initiatives that began in 2020 extended into 2021, and many companies continued to build out their remote and hybrid work capabilities. Pressure to contain costs and increase efficiencies endured, as well, says Joshi. But the accumulative advance toward greater cloud adoption is more than a pandemic story; it's a digital one. "It goes beyond, out to all of the newer digital transformation initiatives and the need to innovate faster," Joshi says. "There is no choice but to embrace cloud to do all this digital transformation."

Today, 35% of respondents indicate that 60% or more of their workloads are in the cloud (30% said so in the prior year's survey), and more than half of respondents (54%) say that 40% or more of their infrastructure and applications are in the cloud today (51% said so in the prior year's survey). Respondents expect to make tremendous progress on migrating their
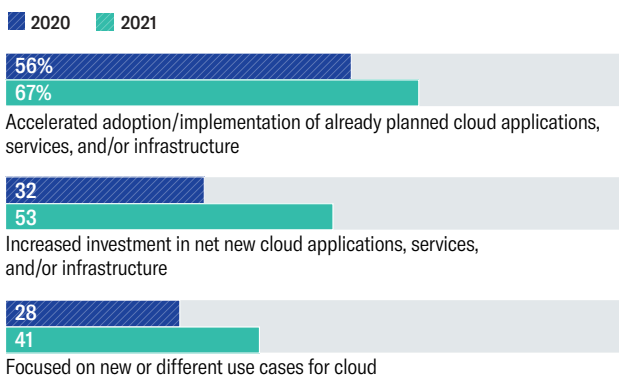
workloads in the near term. Nearly two-thirds (65%) indicate that more than 60% of their IT portfolio will reside in the cloud within two years—a 30-percentage point jump from today. A total of 85% say at least 40% will be in the cloud by 2023, a similar 32 percentage points higher than those reporting that much is in the cloud today.

The bulk of individual legacy enterprise applications are not yet in the cloud, points out Constellation Research's Hinchcliffe. "Cloud is already huge," he explains, adding that there are significant numbers of applications, including some complex, core applications, that remain on-premises (on-prem).

As the survey results show, hybrid cloud (a mixture of on-premises infrastructure, private cloud services, and/ or public cloud) is the dominant technology approach for most organizations, and will remain so. Eighty-five percent of respondents say their organization has a hybrid cloud environment today—and 88% of those respondents anticipate that their organization will maintain a hybrid cloud approach for the foreseeable future.

That hybrid cloud approach is the case at Franciscan Alliance, a 13-hospital health care system across the Midwest. "There's lots of discussion about the value of 'cloud first,'" says Chuck Christian, vice president of technology at Franciscan Alliance. "However, as a hospital, some of our software is not tolerant of network latency and must remain on-prem." While the organization uses an increasing number of cloud-based services, it's a case-by-case decision to determine where best to place a workload.

"As a health care organization, our value lies in our data and data movement," says Jay Bhat, information security officer at Franciscan Alliance. In many cases, cloud services offer benefits to the organization, but they also create challenges. "As you add more cloud providers and more applications, your complexity changes a lot," he says. "Every time you add a new environment, it increases the complexity of how you share and protect data and ensures only the appropriate data goes from one environment to another."

The Difficulties of Rapid Cloud Expansion

While the hastened and expanded use of cloud represents significant progress for enterprises as a foundation for greater agility, flexibility, and digital transformation, the rapid growth in cloud adoption has also challenged organizations.

Most notably, organizations are struggling to acquire the skills required to manage cloud and also contending with increased concerns about cybersecurity and data privacy. According to survey respondents in organizations where cloud adoption sped up or grew over the previous year, the top issues their organizations are wrangling with are a dearth of cloud talent (45%), growing cybersecurity and data privacy worries
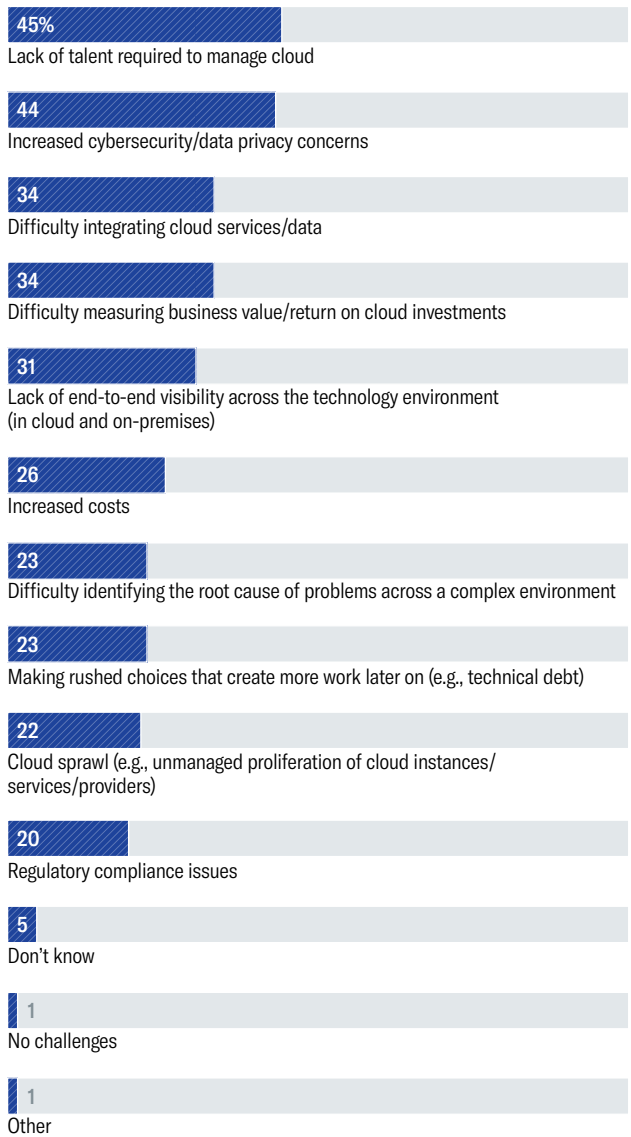
(44%), issues integrating cloud services/data (34%), difficulty measuring the overall business value of cloud (34%), and lack of end-to-end visibility across the technology environment (31%). **FIGURE 2**

FIGURE 2

The Challenges of Cloud Expansion

Organizations are confronting issues related to cloud skills, cybersecurity, and data privacy.

What challenges has your organization encountered due to increased cloud adoption over the past year?
[SELECT ALL THAT APPLY]

45%
Lack of talent required to manage cloud

44
Increased cybersecurity/data privacy concerns

34
Difficulty integrating cloud services/data

34
Difficulty measuring business value/return on cloud investments

31
Lack of end-to-end visibility across the technology environment (in cloud and on-premises)

26
Increased costs

23
Difficulty identifying the root cause of problems across a complex environment

23
Making rushed choices that create more work later on (e.g., technical debt)

22
Cloud sprawl (e.g., unmanaged proliferation of cloud instances/ services/providers)

20
Regulatory compliance issues

5
Don't know

1
No challenges

1
Other

Source: Harvard Business Review Analytic Services survey, October 2021

> "Cloud is no longer just a technology; it's an operating model for the enterprise. That is reflected by the growth and acceleration of cloud adoption," says Yugal Joshi, partner at Everest Group.

At Franciscan Alliance, IT leaders see themselves as the beneficiaries of cloud vendors, who can attract the best and brightest talent to deliver technology innovation to the health care system. But maintaining the internal skills necessary to manage the increasingly complex hybrid cloud environment is a challenge—and a priority. "Our biggest challenge is keeping up with the different cost models and service offerings and what tools we can use to solve which problems," says Franciscan Alliance's Christian.

Escalating concern over cybersecurity and data privacy as organizations pick up the pace on their cloud journeys is not surprising given the omnipresence of cyber threats. "Cybersecurity is one of the top two concerns for CIOs [chief information officers] overall, just behind digital transformation," Hinchcliffe says. "It's an area of significant spend and focus." It's also one that is closely tied to visibility into and management of an organization's diverse technology ecosystem.

The aim at Franciscan Alliance is to enable end-to-end visibility across the technology environment in order to improve IT management and cyber defenses. Managing a hybrid cloud environment and using disparate tools to do so is a challenge for organizations. "A big area we're working on is internal governance and understanding," says Christian. "And if it doesn't exist in our data center, who is responsible for what?" Ultimately, the company would like to have "single pane of glass" visibility and the ability to manage across the entire technology environment, says Franciscan Alliance's Bhat.

The value of having tools and a strategy in place for integrating cloud services and data (no matter where it resides) is evident. Without that, organizations struggle to manage their multi-cloud and hybrid cloud environments. "Data management is something that is causing a lot of aggravation," adds Hinchcliffe. "I believe it is going to get resolved, but these are still pioneer times, and pioneers are the ones with the arrows in their back. Organizations are still trying to figure out data management as more of their data resides in the cloud."

That's one of multiple reality checks organizations are encountering in the rush to cloud. "Many of [these initiatives] were haphazard in some respects," says Hinchcliffe. As a result, he explains, some organizations were surprised by their cloud bills over the past year, dissatisfied with vendor service-level agreements (SLAs) and relationships, or struggling with the systems and data integration challenges they encountered. At this point in time, some leaders are also realizing the limited benefits that "lift and shift" migrations to the cloud provide, while others are beginning to see that the best cloud decision making is aimed not solely at increasing efficiency, but also around spending in the right ways to enable business goals, says Everest Group's Joshi.

Consistent Goals—and Some Missed Opportunities

Ensuring cloud investments are aligned with business outcomes is increasingly important. While the earliest generation of cloud services was pitched as money-saving mechanisms for the organization, cloud is now clearly much more than a lever for cost savings. It's a critical foundation for speed, agility, resilience, and innovation.

Respondents to this year's survey are by and large consistent in looking for the same outcomes from their cloud investments as they were in the prior year's survey. Topping that list are business agility, cost flexibility, and data capabilities. When asked to choose the five business results that their organizations are most seeking from cloud, business agility topped the list, as it did in 2020. Just over half of respondents (52%) put business agility in their top five—the most popular desired outcome this year. **FIGURE 3**

In addition, 44% are seeking cost reduction or flexibility (ranking second, as it did in the previous year), 42% are seeking the ability to access/analyze/act on data and provide insights, and, tied at 39%, are those seeking accelerated innovation and seeking increased standardization or process efficiency. That only around four out of 10 put innovation in their top five, and only around one-quarter are seeing results in this area, may be surprising. More important, it's a missed opportunity—as cloud serves as a key foundation and enabler of digital transformation and business innovation today, says Joshi.

When asked what outcomes their organizations have realized to date as a result of their investments in cloud, 42% say their organizations have achieved increased business agility results from the cloud; 39% have experienced cost reduction or flexibility; one-third have achieved results related

to the ability to access/analyze/act on data or provide insights; and 27% have seen accelerated innovation. For all of these goals, there's a gap between the outcomes respondents are most seeking to achieve and the number of respondents actually reporting progress in each area, a finding consistent with 2020 results.

A Time to Reassess—or Miss Out on Value

In the past year, some organizations have begun to reconsider their cloud approaches. "Now they're doing real vendor research, thinking about product selection and architectures, looking at vendor relationships, SLAs, and costs," says Hinchcliffe. "They are going back and looking at all of this stuff they had to accept at face value the first time around."

John Heasman, chief information security officer (CISO) at Chegg, says that the Santa Clara, Calif.-based education technology provider has been a longtime cloud customer, taking advantage of cloud-native services to address issues of complexity of scale. Since the pandemic began, Chegg has had to rapidly scale its services, experiencing a surge in demand
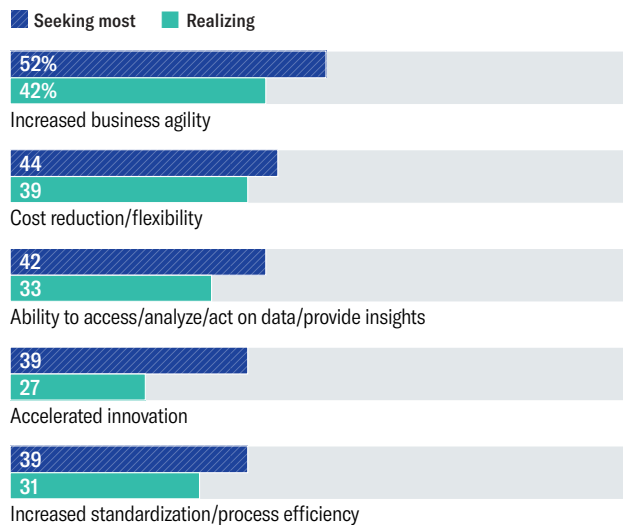
FIGURE 3

Cloud Goals and Results

Organizations are seeking (and sometimes achieving) improvements in agility, costs, and data capabilities.

What business outcomes is your organization seeking most from its investments in cloud? [SELECT UP TO FIVE. SHOWING TOP FIVE OF 12 POSSIBLE CHOICES.]

What outcomes has your organization realized to date as a result of its investments in cloud? [SELECT ALL THAT APPLY]

■ Seeking most   ■ Realizing

52%
42%
Increased business agility

44
39
Cost reduction/flexibility

42
33
Ability to access/analyze/act on data/provide insights

39
27
Accelerated innovation

39
31
Increased standardization/process efficiency

Source: Harvard Business Review Analytic Services survey, October 2021

as online learning became the dominant educational model. "Cloud enabled us to manage that [surge]," Heasman says.

Chegg began rearchitecting its cloud approach over the past year to create smaller, more flexible cloud accounts for use by its engineering teams. "We've been in cloud for so long, we've learned a lot of what's working and what isn't working," Heasman says. "We ended up in a position where we needed to take a step back and look at our architecture to align with best practices in cloud infrastructure and improve our processes overall." After educating the leadership team on how this investment would set the company up for the future in a more scalable way by speeding up the development and deployment of new services, the work began in the spring of 2021. It will continue through 2022. "It's not just a case of saying, 'Here's a new account. It's yours,'" Heasman says. "It required a lot of planning to ensure the right level of oversight while still enabling our team to get the full benefit of cloud-native technology."

Technology functions across industries are under pressure to enable and deliver business results. Nearly all respondents (90%) agree that their organization's IT function is increasingly expected to deliver business outcomes or results. Cloud is often a key enabler of those technology-enabled business goals.

At Chegg, Heasman and his IT counterparts are charged with arming the company's engineers with the capacity and capabilities required for faster agile delivery. Heasman's challenge is making sure that happens in a secure and consistent way without slowing the business down. "On the one side you have cloud infrastructure and security teams wanting to make sure those guardrails are in place, and on the other you have the consumers of cloud-native services who need to build on them," Heasman says. "You have to get that balance right so engineering teams are able to take full advantage of faster delivery in a measurably secure way."

Access to common data can ensure greater security, consistency, and collaboration in managing cloud resources. A cloud veteran, Chegg has also implemented "infrastructure as code" to automate the configuration of cloud resources and eliminate configuration drift (changes to configuration that can create cybersecurity risks) that could occur. However, many IT organizations are having trouble keeping up with the rapidly evolving requirements of increased cloud adoption. Most respondents (84%) agree that the roles and responsibilities within their organization's technology teams are rapidly evolving due to increased cloud adoption. More tellingly, nearly two-thirds (62%) agree that their organization is having difficulty keeping up with those shifting roles and responsibilities.

"Cloud can be quite quick and easy to adopt," says Hinchcliffe. "But many IT organizations have found themselves strained in terms of providing IT support. Their

biggest pain point has been supporting all the changes that have happened over the past two years and figuring out what has worked and what hasn't."

Optimizing Cloud Management for the Future

As organizations continue on their cloud journeys, there will continue to be growing pains. "The number of vendors and the number of services each vendor offers are just growing exponentially," says Joshi. "And cloud sprawl is becoming worse."

Chegg's Heasman underscores the importance of being careful and deliberate about cloud strategy and structure. "Follow the best practices as they emerge," he advises. If you allow businesses unfettered access to cloud services, they will use it. "Later on, you'll find all these services you didn't know you had," Heasman says. "Figuring out how to govern and control that is an interesting challenge."

Not all organizations are getting everything they need from their cloud vendors to manage and optimize their cloud environments. Just 21% strongly agree that their cloud vendors provide all the necessary tools and processes to manage and optimize their cloud environments, while 42% somewhat agree.

Chegg, which has grown partially through acquisition, has also accumulated a multi-cloud environment in the process. "It's been an interesting challenge because we want to simplify things to a single pane of glass [for management], but no one cloud vendor can provide that," Heasman says. Chegg is working with a third-party partner to create a consolidated approach to cloud security and data discovery.

Having a clear enterprise plan for data access and use is critical to simplifying and coordinating the management of increasingly complex multi-cloud and hybrid cloud environments. The majority of respondents report that their organization has a comprehensive data strategy for managing its technology environment. More than two-thirds (68%) say their organization has a plan for how it collects, stores, manages, shares, and uses data across its technology environment, including cloud. There remains room for improvement, however. Improving data strategy is the leading cloud priority for the near future, according to the survey results. More than half (55%) of respondents say that improving their strategy for managing and using data across the technology environment will be a key area of focus and investment over the next two years. **FIGURE 4**
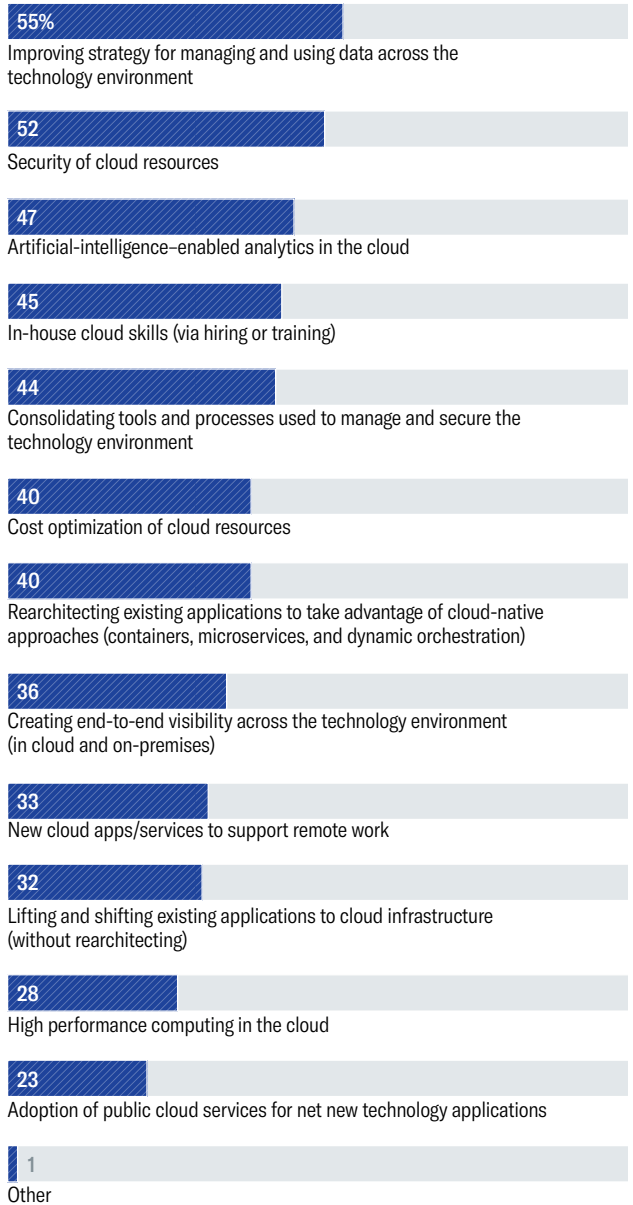
"CIOs are witnessing this diaspora of data going out into this cloud estate they can't control. Data is spreading to far corners of the world," says Hinchcliffe. "This has led to some angst: trying to figure out data management when most of the data is in the cloud."

FIGURE 4

Cloud Investments for the Future

Data strategy, security, and artificial-intelligence–enabled analytics are top priorities.

When it comes to your organization's cloud strategy, in what areas will it be focusing/investing over the next two years? [SELECT ALL THAT APPLY]

55% Improving strategy for managing and using data across the technology environment

52 Security of cloud resources

47 Artificial-intelligence–enabled analytics in the cloud

45 In-house cloud skills (via hiring or training)

44 Consolidating tools and processes used to manage and secure the technology environment

40 Cost optimization of cloud resources

40 Rearchitecting existing applications to take advantage of cloud-native approaches (containers, microservices, and dynamic orchestration)

36 Creating end-to-end visibility across the technology environment (in cloud and on-premises)

33 New cloud apps/services to support remote work

32 Lifting and shifting existing applications to cloud infrastructure (without rearchitecting)

28 High performance computing in the cloud

23 Adoption of public cloud services for net new technology applications

1 Other

Source: Harvard Business Review Analytic Services survey, October 2021

"On the one side you have cloud infrastructure and security teams wanting to make sure those guardrails are in place, and on the other you have the consumers of cloud-native services who need to build on them. You have to get that balance right so our engineering teams are able to take full advantage of faster delivery in a measurably secure way," says John Heasman, CISO at Chegg.

Getting a better handle on data—not just business data, but also the operational data necessary for effective and proactive IT performance cybersecurity management—is paramount. "[The challenge of data management] is the reason why many organizations have set up data and cloud centers of excellence," says Joshi. "Data is so critical, and many organizations need a lot better data strategy than they currently have. Better management of metadata—which is important to innovation—is also essential when doing cloud transformation." Integrating more automation into data pipelines will help, he adds.

Another key area of focus and investment for the near future, according to survey respondents, is improving security of cloud resources. In addressing security of cloud resources, DevSecOps (an approach that integrates security throughout the software development life cycle) is a tactic that's been gaining ground as organizations seek to embed security into their applications development and infrastructure processes, says Joshi. Mandating a security-first mindset enterprise-wide is necessary to prevent workarounds, he adds.

Cloud economics will continue to play an important role, especially as the migration of more complex workloads like enterprise application and mainframes comes up for consideration. "The simpler workloads are done," he says. "IT leaders will need to build much stronger business cases to get their leadership teams to buy into the investments required to modernize these more complex systems." Organizations will need to put more effort into planning and thinking through these choices, as well.

Taking Tomorrow into Your Own Hands

The continued march to the cloud is certain. "The questions are, what does the journey look like? Which workloads will go where and how? These are complex questions," says Joshi. As the proliferation of cloud vendors and services continue, organizations will also have to figure out viable multi-cloud architectures and strategies, according to Hinchcliffe.

As the survey results indicate, the majority of organizations are intent on improving strategy for managing and using data across the technology environment. That strategy, along with a common data foundation, will be essential to extracting the full value of cloud investments going forward and achieving the outcomes organizations are seeking.

Ultimately, the success of these efforts over time will lie in the hands of cloud customers themselves. Cloud vendors will always oversell the value of cloud technology, according to Bhat—especially when talking to non-tech business leaders. "The truth of the matter is that the technology is just one piece of the puzzle," he says. "In order to get the value from it, you have to put the right people and processes in place and engage in the process of rolling out new functionality, testing it, and changing your business processes. Without that, you lose all the value of moving to the cloud."

Those organizations that don't optimize their approaches risk missing out on the benefits of cloud, not only in terms of costs and efficiency gains, but also when it comes to the strategic upside of cloud as a foundation for innovation, business advantage, and future success in a fast-moving, volatile, and hypercompetitive marketplace. "The ability to rebuild your infrastructure is a massive benefit, not least from a security perspective," says Heasman. "There's no single right answer. The key is to find the right balance within an organization in terms of the ability to use cloud services and also putting the right security and compliance guardrails in place. If you plan your strategy really carefully, you can future proof your cloud plan against business needs."

METHODOLOGY AND PARTICIPANT PROFILE

A total of 300 respondents drawn from the HBR audience of readers (magazine/enewsletter readers, customers, HBR.org users) completed the survey.

Size of Organization

13%
500–999
employees

31%
1,000–4,999
employees

12%
5,000–9,999
employees

45%
10,000 or more
employees

Seniority

21%
Executive
management

55%
Senior management

31%
Middle management

1%
All other grades

Key Industry Sectors

21%
Technology

14%
Financial services

10%
Manufacturing

9%
Health care

All other functions
less than 8% each

Job Function

24%
IT

16%
General/executive
management

9%
Sales/business
development/
customer service

8%
R&D/innovation/
product
development

All other functions
less than 8% each

Regions

52%
North America

19%
Europe

15%
Asia/Pacific/
Oceania

9%
Latin America

4%
Middle East/Africa

Figures may not add up to 100% due to rounding.

Harvard Business Review

ANALYTIC SERVICES