HPE GreenLake

From hybrid cloud by accident to hybrid cloud by design

Enterprise decision-makers reveal how
hybrid cloud opens up new opportunities

Executive summary

Research shows that enterprise decision-makers are increasingly choosing hybrid cloud as their preferred operating model because it offers significant value to the business. There is no one right way to build a hybrid cloud; it exists in many forms and varies from one enterprise to the next. But all hybrid cloud advocates tend to say the same thing about their strategy: it improves the flexibility and responsiveness, which in turn improves the ability of the organization to draw meaningful insights from data and open up new opportunities for growth. They also report that hybrid allows them to incorporate multi-generational IT into their environment, addresses security and redundancy issues and helps them meet compliance standards.

This report contains a behind-the-scenes look at real-life hybrid cloud experiences from a survey of hundreds of chief executive officers (CEOs), chief information officers (CIOs), chief technology officers (CTOs) and other IT decision-makers. Their candid advice, based on personal experience, can help guide your organization as you plan and implement your own successful hybrid cloud strategy. ■

Table of contents

Methodology

Quantitative research: 42-question questionnaire with 919 enterprise cloud software decision-makers who are manager-level and above, working in IT or Operations, in nine countries (Australia, Canada, France, Germany, India, Italy, Japan, the UK, and the US), between Dec. 19, 2022, and Jan. 12, 2023.

Qualitative research: 10 one-hour interviews, conducted by an applied behavioral scientist, with CIO and CTO decision-makers in medium to very large enterprises in the US, between Dec. 16, 2022, and Jan. 30, 2023. Some participants had been with their company for anywhere from less than five months to 25 years. We used IDC's definition of business size: medium 100-499 employees; large 500-999 employees; very large 1,000-plus employees. For the purpose of clarity, **hybrid cloud** was defined as a mix of on-premises, private cloud and public cloud, and **multi-cloud** was defined as combining two or more public clouds. There was a common understanding among participants of hybrid cloud but not of multi-cloud.

Contributors

Content producer	Lucinda Henry
Associate producers	Rachel Fairley, Kye Yang Lass, Alison Paisley, Camilla Patel, Kellie L. Phillips
Writers & sub-editors	Rachel Fairley, Alison Golan, Christopher Null, Null Media,
Researchers	Ledvi Beza and Alexis Zaken, FKA, Publicis; Dana Pidliskey and Jane Strumba, Publicis Insights; with research partner Savanta
Editorial contributors	Randy Cairns, David Crozier, Katherine Ducker, Anil Gadre, Joseph George, Matt Maccaux, Jason Newton, Scott Wiest, Brad Young
Design	Giana Bucchino, Tim Harms

Chapter 1

From hybrid by accident to hybrid by design

The early days of cloud adoption were admittedly a bit of a scramble for most. Enterprises quickly saw the value the cloud could bring to them, so numerous workloads were lifted and shifted to the cloud and new applications were developed in the public cloud. In the years that followed, many enterprises ended up with a mix of workloads across a variety of cloud platforms, both public and private, as well as workloads that stayed on-premises. Before the term **hybrid cloud** was ever coined, organizations were in fact deploying that model — and realizing key benefits.

Today, many enterprises have hybrid architectures, with services layered upon services, each with its own operating model and security protocols. This is commonly referred to as **entanglement**. Meanwhile, public cloud costs are increasing: what was once a no-brainer decision to adopt a cloud-first strategy for workloads — which always meant public cloud first — is no longer so obvious. Emerging now is a realization that hybrid cloud — an operating model that includes a combination of on-premises, private cloud and public cloud — makes perfect sense. The key is to have a strategy to execute against. It's becoming well understood that certain workloads are best suited for the public cloud while others are best left on-premises or in a private cloud environment. As well, different cloud service providers may be better suited for different types of workloads. (The use of multiple cloud providers, which is increasingly common, is known as multi-cloud.)

Meanwhile, more and more data is being created and processed at the edge, and organizations are realizing the need to maintain control over it. Colocation providers are maturing and providing better value for users. And viable hybrid cloud platforms such as HPE GreenLake from Hewlett Packard Enterprise are redefining how customers can bring a cloud experience and operating model to all their apps and data across their edge environments, colos and clouds. For progressive organizations, this means IT strategy is no longer a question of being "cloud first" but rather, as one respondent in our research noted, being "cloud right."

The IT market is shifting, in part because it must: capital is getting more expensive, and infrastructure is getting increasingly complex. As such, hybrid cloud strategies are paving the way for optimally scaling one's business while balancing cost, performance, and control.

Technology leaders are also juggling multi-generational IT inherited over time and enabling emerging technologies such as artificial intelligence (AI), machine learning, and blockchain. Most of all, a hybrid cloud approach allows organizations to balance public and private clouds depending on their specific requirements and use cases. This means that businesses can leverage the benefits of both cloud environments without being restricted by the limitations of one.

In early 2023, HPE investigated how enterprises are deploying hybrid cloud in the real world, surveying and interviewing enterprise cloud decision-makers in more than 900 companies across nine countries. The goal of the research: to understand why and how these organizations are leveraging hybrid cloud, what lessons they've learned on their journey and where hybrid cloud is headed. ■

Definitions

Hybrid cloud: a combination of on-premises, private cloud and public cloud

Multi-cloud: combines two or more public clouds.

Edge to cloud: HPE's differentiated architecture; a computing topology where processing is located anywhere from the edge to the cloud.

Edge: where a business generates data that can be acted on, for example a retail store or autonomous vehicle.

Private cloud: an on-site or colocated cloud computing architecture that is accessed and controlled by the business.
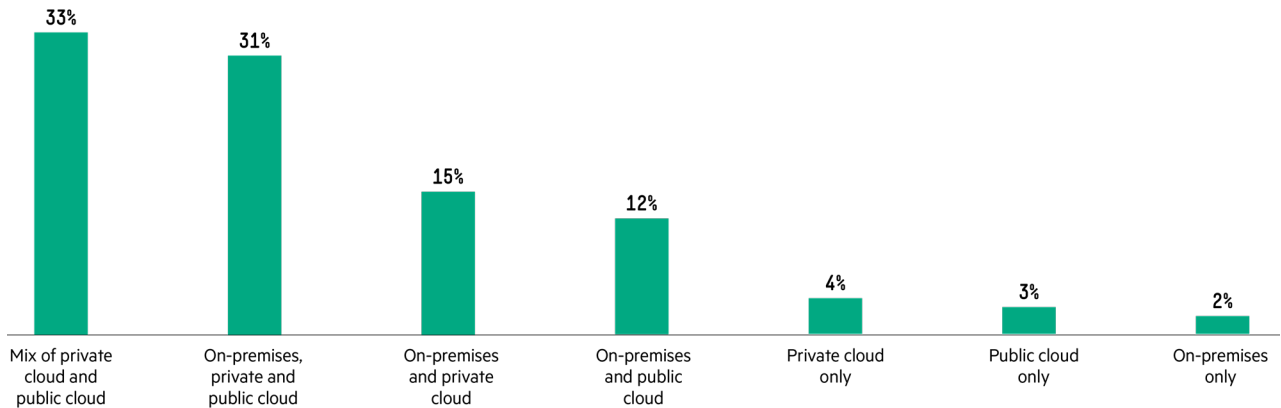
Chapter 2

How are enterprises leveraging cloud today?

Hybrid cloud isn't just an option for the modern enterprise; it has emerged as the prevailing operating model with 91% of organizations saying they use at least two types of models. More specifically, 33% of enterprises we surveyed said they use a mix of private and public clouds, and 31% said they use a mix of private and public clouds as well as on-premises (see Chart 1). Organizations that use only one form of cloud (either public or private), or those who exclusively use on-premises represented less than 10% of all organizations we surveyed.

Chart 1: Select which option best describes the model currently utilized at your company

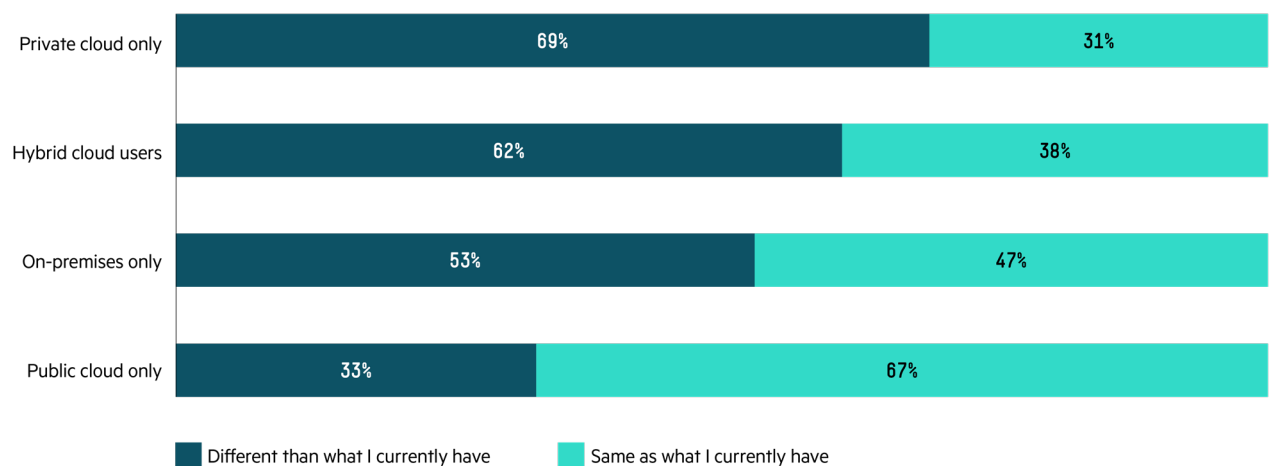|	
33%	Mix of private cloud and public cloud
31%	On-premises, private and public cloud
15%	On-premises and private cloud
12%	On-premises and public cloud
4%	Private cloud only
3%	Public cloud only
2%	On-premises only

Quantitative research - base size: total sample (n=919)

By a significant margin, enterprise leaders said their hybrid cloud strategy represents the right mix of technologies needed to meet the unique goals of their business. While many said they are happy with the way their model stands, others described it as transitional, a midway point as they continue to move operations from on-premises to the cloud. Many respondents noted they expect their operating model to change over the next five years or more (see Chart 2). Many respondents said they are moving from on-premises to private or public cloud, hybrid cloud (a mix of on-premises, private cloud and public cloud) and multi-cloud (two or more clouds, private or public). By a significant margin, the top two results — hybrid cloud and multi-cloud — are likely to remain the most prominent strategies used.

Chart 2: Is the model you'd like to have in the next 5 years different or the same as what you have currently?

	Different than what I currently have	Same as what I currently have
Private cloud only	69%	31%
Hybrid cloud users	62%	38%
On-premises only	53%	47%
Public cloud only	33%	67%

Quantitative Research - Base Size: Private cloud only (n=36), On-premises and public cloud (n=108), On-premises and private cloud (n=140), On-premises private cloud and public cloud (n=285), Mix of private and public cloud (n=304), On-premises only (n=19), Public cloud only (n=27).

Most technology leaders said they expect to continue to migrate toward either public or private cloud environments (or both), but few expect to get there entirely. Overall, a "what makes sense" approach has widely emerged, which allows organizations to use the right mix of technologies to meet their staffing and budget needs, accommodate unique processes that help their companies reach their business goals, minimize downtime, connect teams and maximize uptime and security. This is now often referred to as **cloud smart**. Hybrid cloud was characterized by many respondents as important for a variety of reasons and business requirements, including the need to cope with multi-generational technologies, address security or compliance concerns and meet reliability needs. Some respondents noted they operate very specialized or customized systems that cannot be shifted to public cloud, while others cited problems with very large files that would not be easily accessible if moved off site. Security concerns were also a common rationale for maintaining more local control over workloads.

One director/VP from a large enterprise in India provided a simple rationale for their approach: "We are now working with both private and public cloud. In the private cloud, we store our sensitive data and maintain a highly secure database, whereas in the public cloud, we share information with customers and third-party vendors." Similar "ideal mix" arrangements were echoed by numerous other respondents.

Why enterprise leaders think other organizations go fully cloud?

- They are new businesses and can move fast
- They are small and can move fast
- They are less complex and have fewer moving parts
- They have remote teams
- Their risk scale is different
- An absence of legacy systems
- Because of the cost of non-cloud tech: staffing, maintenance, and repair
- The leaders are young
- They tend to jump on the bandwagon

❝

I think there's consensus that [hybrid cloud] is the most common situation now for most companies, the vast majority of companies."

- CIO, medium-sized enterprise, US

"Five years ago, the press was [forecasting] that by today, 60% to 70% of companies would be 100% based in public cloud," said one respondent, a CIO of a large enterprise in the US. "That hasn't happened, and I'm arguing it's not going to happen. Five years from now, at most only 20% or 30% of companies will be 100% public cloud and less than 5% will be fully on-prem. Most of us are going to be hybrid."

Hybrid cloud: examining the pros and cons

When comparing hybrid cloud with public cloud or private cloud strategies, technology leaders said they are focused on a few key areas: capability maximization, cost savings, resource utilization and avoiding downtime and security breaches. As well, leaders' biggest perceived benefits of hybrid cloud are its flexibility and customizability. Hybrid also allows enterprises to accommodate legacy systems that are hard to change or move, and it helps them address unique business needs. However, this flexibility was also seen as somewhat of a downside. Without the momentum to force them to do otherwise, some felt they were holding on to legacy systems longer than they should — inertia being the enemy of progress. In addition, they said the larger footprint created by the hybrid cloud highlights the need for more complex security protocols. (We'll examine this issue in more detail in a later chapter.) ■

Enterprise leaders share the advantages of a hybrid cloud strategy.

"More secure, in better control of our own data."
– Director/VP, large enterprise, Germany

"Allows organizations to be more agile and flexible, as they can easily move workloads between different types of cloud solutions as their needs change."
– CEO, large enterprise, India

"The ability to have a hybrid cloud allows you the flexibility to grow up certain parts of your environment because you are going to acquire a company and want to take their systems and move them into one of those existing cloud components."
– CIO, large enterprise, US

"There is security and control over backup storage, and if one system crashes, you can easily access a separate system."
– CTO, very large enterprise, Australia

"With hybrid cloud, the benefits are it's really made more for your specific needs."
– CIO, very large enterprise, US

"It might be more secure for certain aspects of your systems. It's going to be more customized or customizable to your business. It might allow you to keep systems in place that are difficult to lift up into the cloud. It allows a gradual transition to the cloud."
– CIO, very large enterprise, US
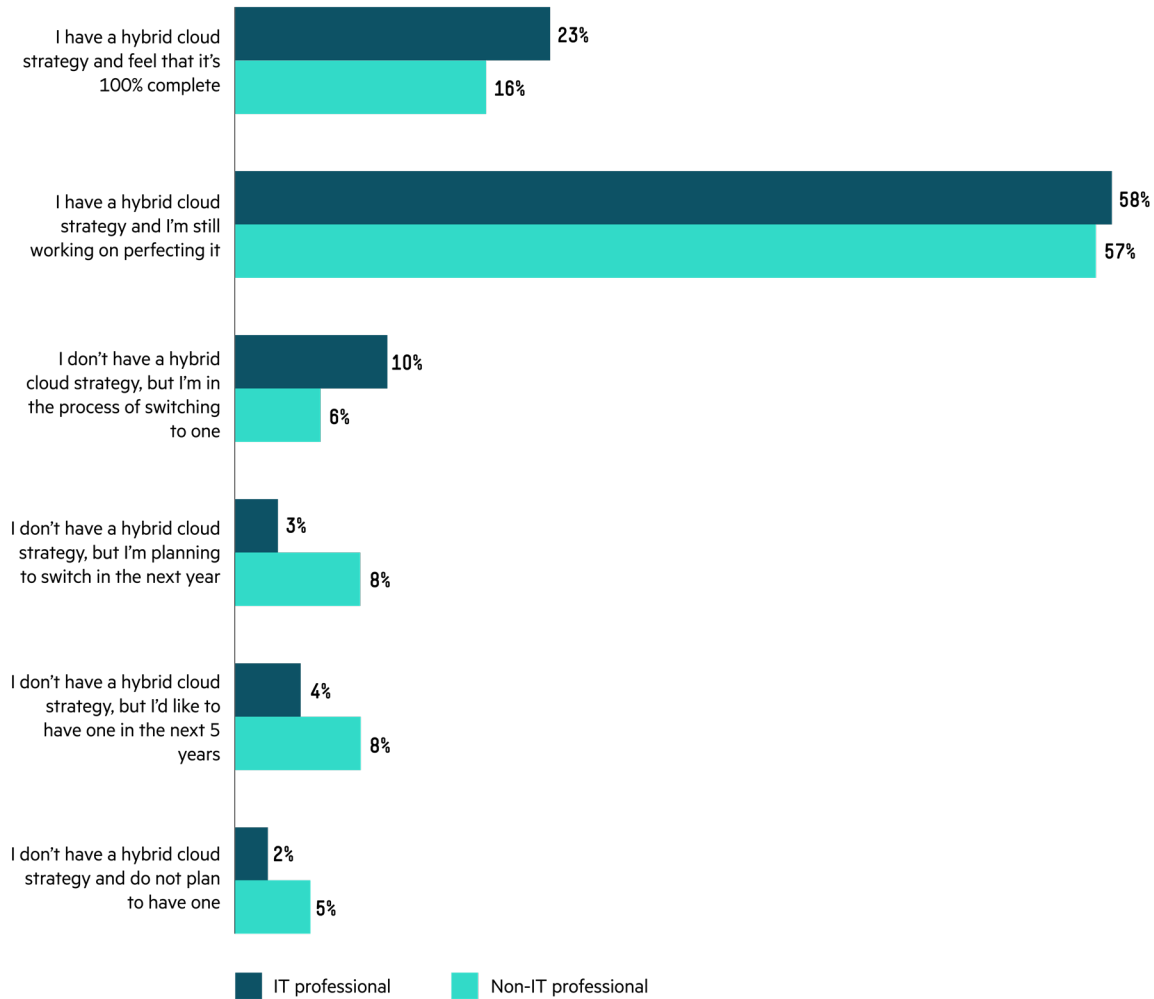
Chapter 3

Completing your hybrid cloud strategy

Respondents are unanimous that hybrid cloud is not a destination, but rather an experience that delivers transformation. How do you complete your hybrid cloud strategy? You don't, but you do need to continually revisit it.

IT decision-makers overwhelmingly indicated that milestones were lacking when it came to their hybrid cloud roadmap, suggesting the process is really a journey rather than a destination. Some CIOs and CTOs were able to describe in percentages how far they have come in completing their cloud strategy, but most spoke about these efforts in general terms.

Only 23% of respondents (and 40% of CEOs) said their hybrid cloud strategy was 100% complete, while 58% said they have been working on it for many years (see Chart 3). This indicates there may be a difference of perspective between CEOs and their technology leaders on the definition of what it means to complete a hybrid cloud strategy.

Chart 3: Which of the following best apply to your current situation?

I have a hybrid cloud strategy and feel that it's 100% complete — IT professional 23%, Non-IT professional 16%

I have a hybrid cloud strategy and I'm still working on perfecting it — IT professional 58%, Non-IT professional 57%

I don't have a hybrid cloud strategy, but I'm in the process of switching to one — IT professional 10%, Non-IT professional 6%

I don't have a hybrid cloud strategy, but I'm planning to switch in the next year — IT professional 3%, Non-IT professional 8%

I don't have a hybrid cloud strategy, but I'd like to have one in the next 5 years — IT professional 4%, Non-IT professional 8%

I don't have a hybrid cloud strategy and do not plan to have one — IT professional 2%, Non-IT professional 5%

■ IT professional ■ Non-IT professional

Quantitative Research – base size: IT Professionals (n=337); Non-IT Professionals (n=93)

For those still working on their hybrid cloud adoption, the question of how far along they were was hard to discern. Most non-IT professionals (54%) estimated they were somewhere between half and three-quarters complete with their migration, but definitions on how to quantify this were elusive (see Chart 4). Some respondents defined their migration's completeness by how close to final their individual projects, migrations or integrations were, or by the percentage of workloads they had planned to move to the cloud and had successfully shifted. Others simply measured the amount of money they had shifted from capital expenses to operating expenses.

Tech leaders call out specific measures and milestones

1. "Well socialized and there is buy-in"
2. "Cost shifts from CapEx to OpEx"
3. "Cost savings"
4. "Lifetime value of equipment"
5. "Security setup"
6. "Migration projects on time"
7. "Timeline to age out tech"
8. "How much infrastructure is still required"
9. "Things are running well"
10. "Whether or not stakeholders complain"

Chart 4: Using your best estimate, how close are you in completing your hybrid cloud strategy?

- IT professional
- Non-IT professional
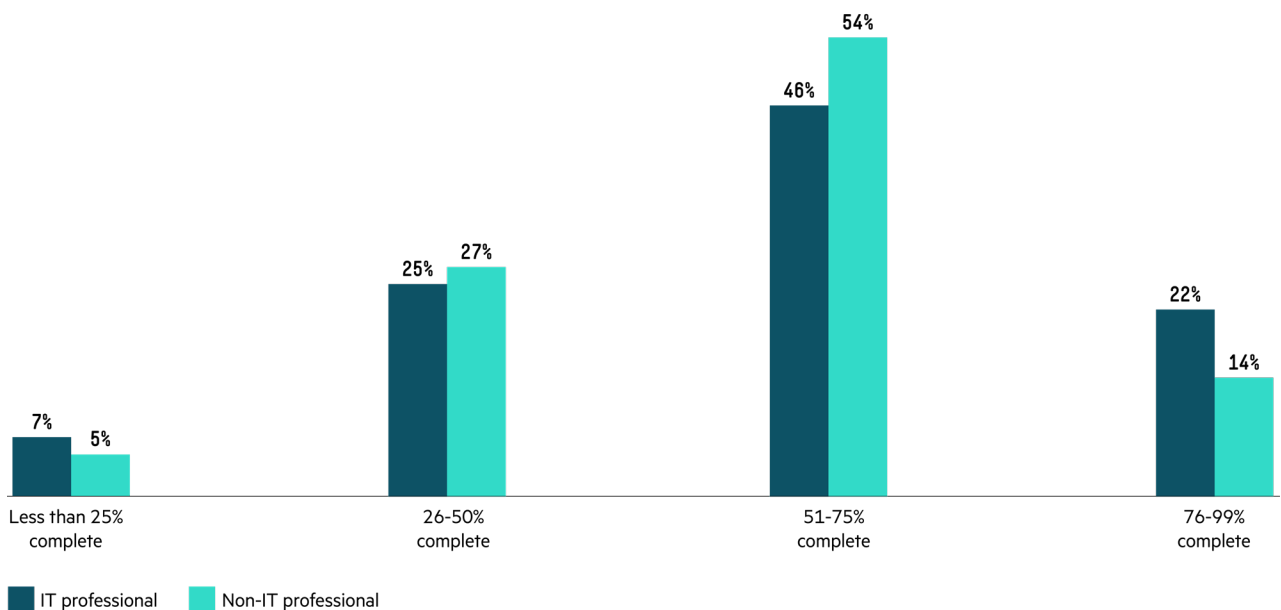
Base: IT Professionals in the process of implementing hybrid cloud strategy (n=227), Non-IT Professionals in the process of implementing hybrid cloud strategy (n=59)

One director/VP in a medium-sized UK-based enterprise said their organization's hybrid strategy will be complete "when the applications are running effectively in different environments." A CTO at a very large enterprise based in Australia said it will be done "when all contact points communicate without interruption." Respondents cited cost savings, stakeholder approval and general smoothness of operations as critical factors for determining whether their hybrid cloud migration was complete.

That said, given the shifting nature of today's enterprise workloads, it's clear that all these descriptions are tenuous and difficult to quantify. As the saying goes, for most enterprises, it's likely that their hybrid strategy simply 'ain't over 'til it's over.'

How does a hybrid cloud strategy evolve over time?

Every hybrid cloud strategy is a journey, and for most organizations it's one that changes as time goes on. Few enterprises have the same cloud strategy today that they had five years ago, and most CIOs and CTOs characterized their cloud roadmap as a living document that is constantly in flux due to market conditions, technical maturity and the changing needs of the business. Many stressed that IT is an area of continuous improvement where the work is never fully done.

Some respondents said they revisit both their cloud strategy and roadmap regularly, though the time frame for that review varied. Review schedules were cited as quarterly, annually, every five years or whenever the end of life of legacy equipment was about to arrive. "It's a rolling thing," said a CIO of a medium-sized enterprise in the US. "Every year, I'm thinking not just about next year but three years out or five years out or 10 years out."

On the other hand, some respondents said what really matters isn't the roadmap but rather the actual work of migrating workloads. Additionally, many others noted they did not fully develop their cloud strategy themselves but rather inherited some or all of it from a predecessor (see

Can a hybrid cloud strategy be completed?

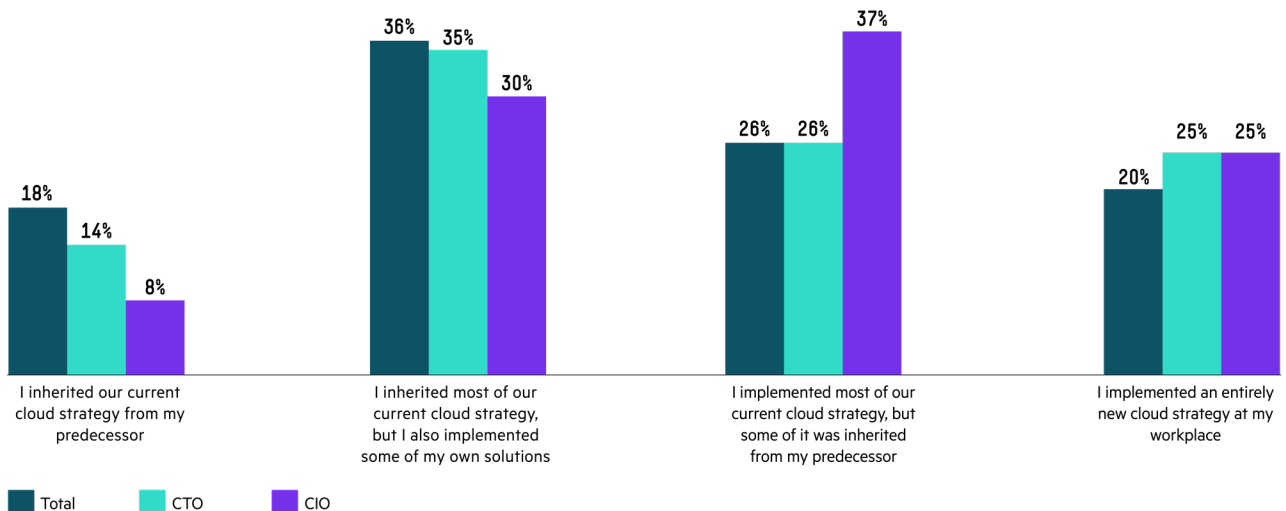"Can it ever really be complete? I don't think it can; it's always evolving with new tech."
– Director/VP, very large enterprise, Australia

"It will be an ongoing strategy that never really is complete but is working well and manageable."
– CIO, medium-sized enterprise, Australia

Chart 5). Only 20% of respondents said they were fully responsible for their organization's cloud strategy. Respondents said one obstacle to completing hybrid cloud transformation is the overall pace of change in the cloud world. Change can be either internal or external. Internal change might include shifting business needs, new goals, new leadership or changes driven by acquisitions and mergers. External changes could be changes in the supply chain, evolving security threats and, of course, changes in technology. Vendors discontinue or change products dramatically or go out of business altogether. Meanwhile, advances in technology, such as through automation and AI, can upend business models and cloud strategies.

Chart 5: Most decision-makers have inherited some degree of cloud strategy from their predecessors

	I inherited our current cloud strategy from my predecessor	I inherited most of our current cloud strategy, but I also implemented some of my own solutions	I implemented most of our current cloud strategy, but some of it was inherited from my predecessor	I implemented an entirely new cloud strategy at my workplace
Total	18%	36%	26%	20%
CTO	14%	35%	26%	25%
CIO	8%	30%	37%	25%

Quantitative research - base size: total sample (n=919), CTO (n=197), CIO (n=158)

Prioritization is critical

The upshot of varying opinions about schedules and roadmaps is that most CIOs and CTOs perceive the need to "complete" a hybrid cloud transformation is not as urgent as the need to do it the right way. Technology and business needs are both constantly changing, so your hybrid cloud strategy needs to evolve accordingly to ensure it remains as complete as possible. This uncertainty causes many organizations to intentionally move slowly because of the fear of failure — namely, that something may stop working properly after it moves to a new operating environment. This delay may cause business setbacks and could bring repercussions from leadership.

Respondents noted those fears and anxieties can be quelled by clearly demonstrating the benefits and rewards of hybrid cloud. Early stakeholders who were skeptical about modernizations often had a change of heart once success was demonstrated, wishing they had made changes earlier.

Again, while technology leaders may feel a sense of urgency around individual projects, some survey respondents did not seem driven by deadlines because they were certain company strategy would keep changing. With an understanding that migration costs money and requires special skills and knowledge, they felt it fully acceptable to move slowly, one step at a time. Prioritization is key here: projects must be categorized based on the value they provide, and organizations must lay the groundwork, such as establishing a base level of security, before leaping ahead to more advanced initiatives.

The optimal strategy is what makes sense for your business

The beauty of a hybrid cloud strategy is that every hybrid cloud implementation can be different. As such, hybrid cloud informs hybrid strategies: there is no one right way for every organization to complete this transformation and no ideal pace at which to move. However, there are best practices for adopting

---

Tech leaders share gaps, barriers and challenges standing in the way of a complete hybrid cloud strategy

Resources
- Time
- Budget
- Staff (in general but also specialized training if needed)

Constant change
- Changing tech
- Changing business needs
- Changing business
- Changing security threats

Business needs
- Conflicting prioritization
- Buy-in from other leaders to continue
- Crawling before walking

---

a hybrid cloud strategy, and this advice is invaluable to getting it just right for each business.

An evolving strategy can be a source of frustration for those who would prefer to have a clear roadmap, but many respondents said it was part of what made their work rewarding and interesting. The fluidity of hybrid is neither positive nor negative — it is simply part of what makes hybrid cloud the right solution.

Again, CIOs and CTOs noted the need to remain agile and adapt to unanticipated changes as they arose. There will always be new technologies, new security threats and changes to the underlying business. Hybrid cloud can help with all these because it is designed to be adaptable. As such, it's important to continue to revisit and refine your organization's hybrid strategy. Many respondents commented that if your strategy is not a living, evolving document, it might indicate things are going in the wrong direction or important details are falling through the cracks. ■
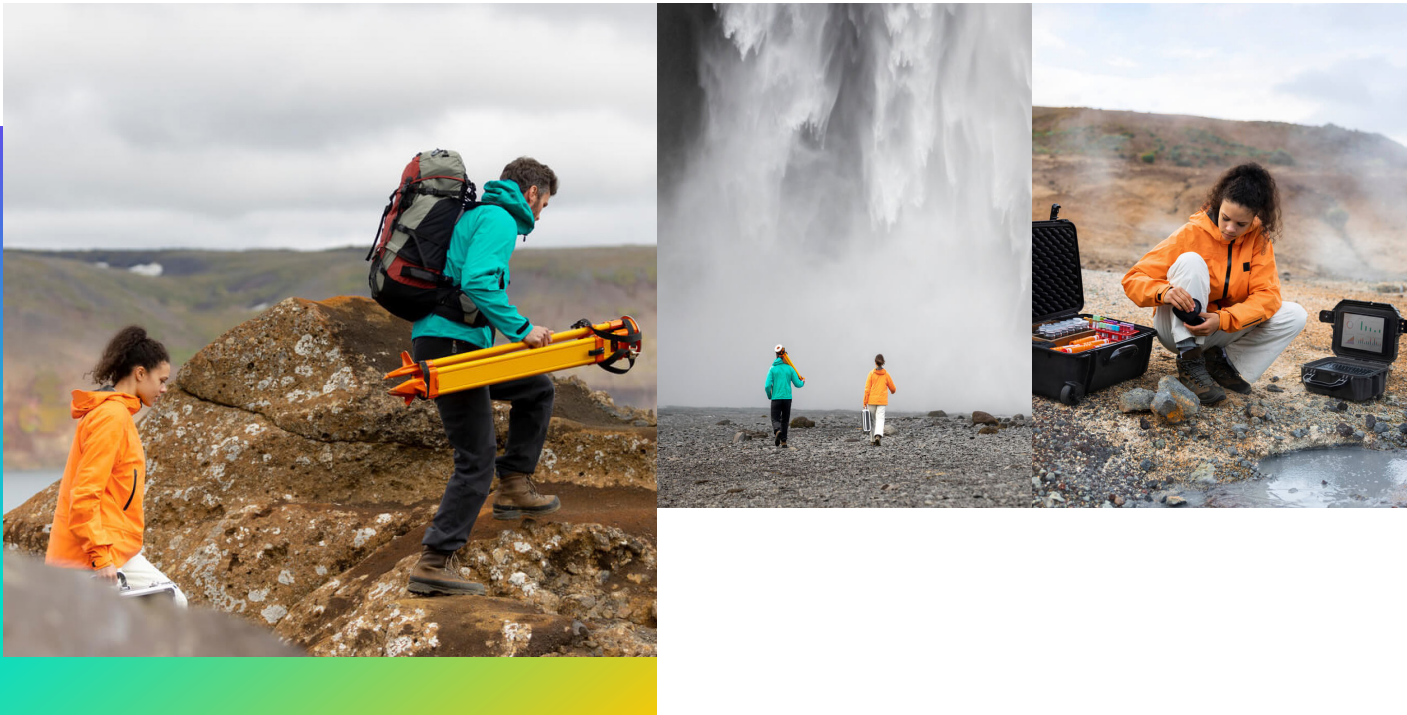
Chapter 4

Using hybrid cloud to control and harness data

Data at the edge continues to explode in size and scale, generated by billions of devices of increasing complexity and power. The abundance of data from edge to cloud resides well outside the realm of traditional computing. Enterprises are grappling with how to harness and control it. How do you access all the data in silos and use it to generate business value? And how do you do so in a way that is efficient and secure?

Hybrid cloud offers the most effective infrastructure design for controlling data

When it comes to controlling and harnessing data, hybrid cloud users reported more success than non-hybrid users. Specifically, 43% of hybrid users said their strategy was effective at controlling and harnessing data across edge to cloud, while only 33% of non-hybrid users said the same (see Chart 6).

Breaking down the numbers further, organizations that operate using both on-premises and private cloud (but not public cloud) infrastructures reported the highest levels of success at controlling and harnessing data across edge to cloud, with an overall 51% success rate. Those with a mix of private cloud and public cloud infrastructures reported a 43% success rate, the next highest level (see Chart 7).

Chart 6: What has your current cloud strategy been most successful at helping you achieve so far?

Controlling and harnessing our data across edge to cloud
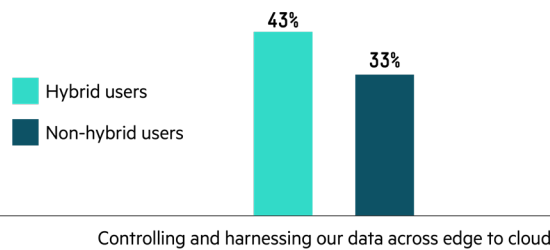
Quantitative research - base size: hybrid users (n=837), non-hybrid users (n=82)

Chart 7: Percent who said their current strategy is successful at: "controlling and harnessing data across edge to cloud"
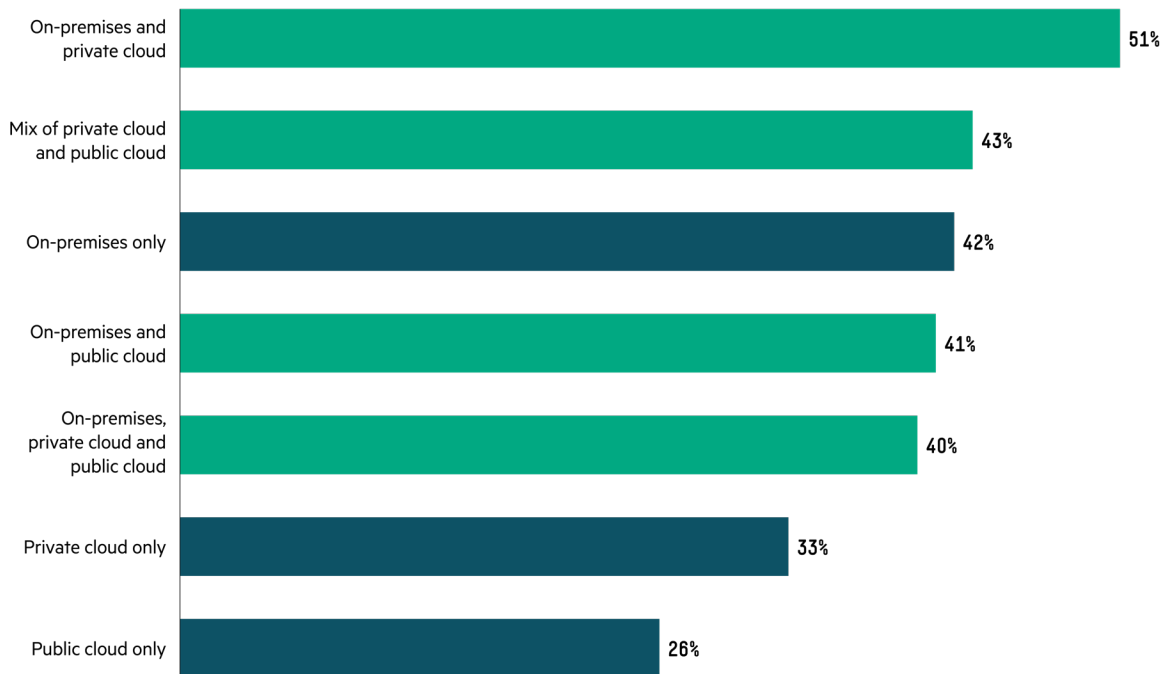
Quantitative research – base size: private cloud only (n=36*), on-premises and public cloud (n=108), on-premises and private cloud (n=140), on-premises private cloud and public cloud (n=285), mix of private and public cloud (n=304), on-premises only (n=19*), public cloud only (n=27*). *Indicates small base sizes; use directionally.

Organizations with **any** type of hybrid cloud environment reported higher success rates at taming edge-to-cloud data than organizations with either private-cloud-only (33% success rate) or public-cloud-only (26% success rate) environments. Ultimately, it is clear that some level of on-premises control is beneficial in ensuring edge data is more accessible, that reporting and analysis is expedient, and that timely action can be taken based on this information.

Why hybrid cloud works best for controlling edge data

So, why does a hybrid cloud design make sense when it comes to harnessing data from edge to cloud? In delving deeper into this question, respondents focused on a few key areas.

First is the question of balance: a hybrid structure allows organizations to manage performance, cost and security all at once, by maximizing the control the organization has over the way data is stored and processed. The explosive growth in the amount of data at the edge has led organizations to pursue strategies to process as much of that data as close to where it lives. This reduces friction and latency and improves performance, as data has less distance to travel for processing while minimizing the need for data to move at all. In cases involving sensitive data and the need for a high level of security, a hybrid approach gives the organization flexibility over where processing is performed as well as the ability to lock down information on a more secure storage system. One respondent said this type of flexibility is new in the industry — it simply wasn't possible a few years ago.

Data harnessing becomes easier with hybrid cloud

"The cloud strategy has really helped to harness a lot of data, which was very hard to do a few years back."
– CTO, large enterprise, US

"We have near real-time data visualization."
– CIO, medium-sized enterprise, Australia

But thanks to the rapid maturation of both edge and cloud technologies, that has finally changed. Survey respondents described seeking a secure and fast way to control and harness data so they can turn it into intelligence quickly.

Factors driving the need for hybrid cloud in edge data management

While all organizations embrace flexibility in general, a few specific factors are driving many businesses to a hybrid cloud strategy. Chief among those is the increasingly distributed workforce. As workers continue to work from remote environments and organizational footprints spread out across the globe, the need for flexibility has increased. With a mix of on-premises, private cloud and public cloud services, organizations find they have the greatest possible amount of flexibility and control in the way they provision their resources. With hybrid cloud, the organization improves its redundancy, scalability and reliability across the board.

In the survey, one CIO of a large US enterprise elaborated on the need for hybrid cloud. They said they want to get the business to the point where workers in the field can capture the data they need and upload it via 5G or a satellite connection to a shared system, where other employees can then access the data on demand for manipulation. While this scenario is certainly possible today, a hybrid model maximizes the flexibility of this type of capability. Remote staff can work anywhere, and data can be stored in the system that's physically closest to their location, closest to the analyst on the receiving end or both.

There's a lot more than just cloud that goes into this kind of infrastructure. We want to put less friction behind getting things done in order to speak to our agility."

- CIO, large enterprise, US

Another CIO of a large enterprise based in the US outlined a different rationale for using hybrid cloud to manage edge data. This enterprise manages millions of customer documents, which are stored in SQL databases on-premises. To help customers find documents using the organization's on-premises storage system, it provides a shared portal. The CIO explained having this type of workload in the cloud would be cost prohibitive. But by using a virtual private network tunnel to connect cloud environments to their on-premises storage system, the organization achieves optimal security that's cost effective.

Getting started with a hybrid approach

Every organization is different, and every hybrid cloud implementation is different. Think about the timing of your transformation and consider establishing a Cloud Business Office to govern and direct all aspects of your cloud program. Take a deep dive into the economics of various cloud solutions and commit to ongoing education about cloud technology. This field changes dramatically from one month to the next, and your focus on learning and research will pay off. ■

Chapter 5

Turning data into intelligence with hybrid cloud

Data on its own can be a useful thing. But can you turn your data into intelligence? That's where a business can find a competitive advantage. As data proliferates from edge to cloud, strategies for getting the value from the data can become elusive. What approach works best? And how does an enterprise's IT infrastructure work to deliver a single source of truth for better decision making?

On-premises architectures are weakest at turning data into intelligence

When we asked participants about their enterprise architecture, one thing was clear: all types of cloud-based strategies beat on-premises-only approaches when it comes to generating meaningful intelligence from data. It didn't matter the specific cloud design they used — public cloud only, private cloud only or a hybrid mixture of cloud on- or off-premises. They all outpaced on-premises-exclusive approaches on this front. At the top of the pack stood public cloud strategies (52% reporting success) with private cloud (47%) close behind. Various hybrid cloud approaches were closely bundled from 46% to 41%. At the bottom of the pack, on-premises-exclusive users reported a mere 21% success rate at turning data into intelligence (see Chart 8).

Chart 8: Percent who said their current strategy is successful at achieving: "turning data into intelligence"
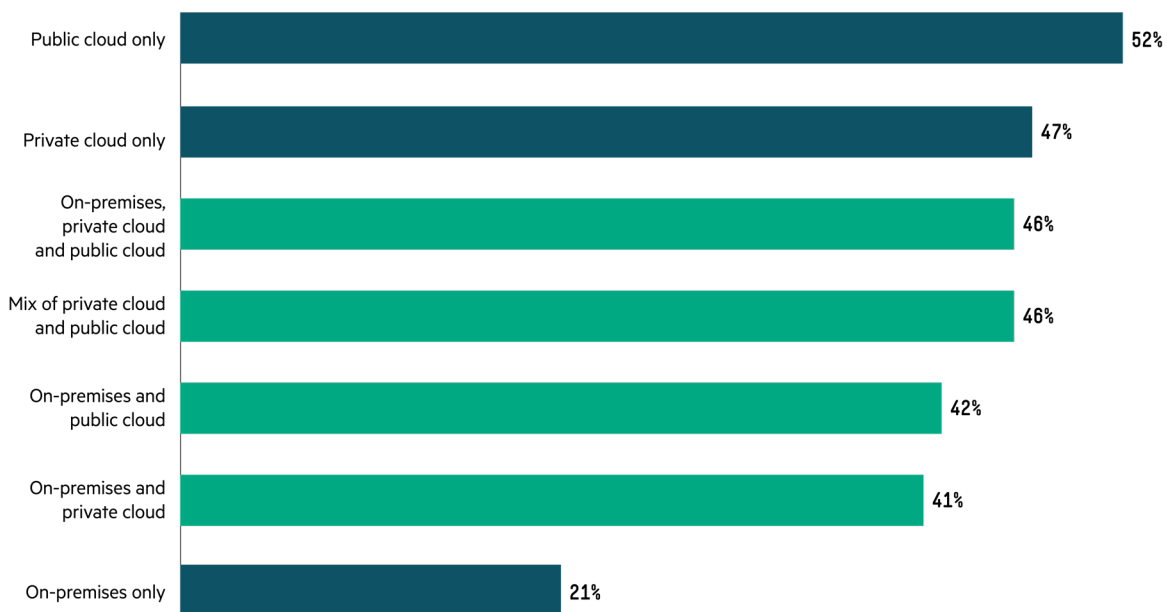
Category	Percent
Public cloud only	52%
Private cloud only	47%
On-premises, private cloud and public cloud	46%
Mix of private cloud and public cloud	46%
On-premises and public cloud	42%
On-premises and private cloud	41%
On-premises only	21%

Quantitative research – base size: private cloud only (n=36*), on-premises and public cloud (n=108), on-premises and private cloud (n=140), on-premises private cloud and public cloud (n=285), mix of private and public cloud (n=304), on-premises only (n=19*), public cloud only (n=27*). *Indicates small base sizes; use directionally.

Why does the cloud help turn data into intelligence? One potential factor is speed, as respondents reported the cloud simply gave them an ability to respond to new data faster than had been possible in an on-premises only environment. And because the cloud offers more resilience, cloud users experience less downtime and more flexibility, helping ensure intelligence is being generated regularly and reliably. Hybrid cloud also plays a key role in helping to manage the vast amount of data being created and stored at the edge, ensuring that data can be processed as close as possible to its point of origin.

The critical role a single source of truth plays

Paramount to the concept of maximizing enterprise intelligence is the development of a **single source of truth,** the aggregation of multiple data sources into a single dataset. A single source of truth does not necessarily mean that all data is stored on a single server or database but rather that all data sources act in unison wherever they happen to be. With a data fabric design made possible through hybrid cloud architecture, data can reside anywhere but still be treated as a unified, cohesive source.

Hybrid cloud is one of the key components that makes a single source of truth possible. Respondents in our survey said the ability to combine data sources from diverse locations helps them find patterns and make meaningful analyses of it. This ability makes intelligence more cohesive and valuable, lessens the amount of time and effort needed to generate analytics, and decreases the amount of noise in reports. Being able to view data through a single pane of glass makes data analysts more efficient and the results of their efforts more accurate.

What is driving the need for hybrid cloud for generating meaningful data insights?

The concept of a single source of truth means different things to different users. Yet ubiquitous in our survey was the fact that using hybrid cloud to achieve a single source of truth meant better reporting accuracy with less overall effort.

"Nobody wants to look at 47 screens to do their job," said one CTO of a very large US-based enterprise. "It just becomes impossible. I don't have time to look at a different screen for every system we have. What I want is a dashboard that summarizes everything: if all the lights are green, I'm good. If one of the lights is red, I want to drill down into it and see what's going on."

That kind of capability is now possible, thanks to hybrid cloud, said the CIO of a large US enterprise. "We

What impact has turning data into intelligence had on your business so far?

"The impact made was massively felt in the way our company functions; we are much more successful."
– CEO, large enterprise, Canada

"Made it easier to identify behaviors that drive business outcomes and made the conversion of data into strategic metrics easier."
– CDO, medium-sized enterprise, UK

are now able to gather data whether it's on the edge, internal cloud, public cloud or wherever," they said. "We have been able to coalesce all those data points to provide a single point of truth."

Echoed another CIO from a large US-based enterprise: "We're getting visibility into what's happening across the company that we haven't really considered before. That, in turn, gives us the ability to better coordinate our resources and apply them more efficiently."

The first step to generating a single source of truth

Whether you decide to embrace hybrid cloud or some other enterprise architectural design, experts say the key is to start by consolidating data sources to find ways to effectively link them together. Focus more on the goals of what you want to do with the data rather than how it should look or where it should be stored. And make sure you invest in training for your teams up front so they fully understand the tools at hand.

CIOs and CTOs said the journey to building a single source of truth in the enterprise can be rocky, but all agreed the results — in the form of much more insightful and timely analyses — is well worth the journey. ■

Chapter 6

Hybrid: the cloud at its most flexible

For some enterprises, "the cloud" refers only to the public cloud: workloads run on as-a-service systems operated by the industry's major cloud providers. For others, the cloud can mean something private: tightly controlled systems that are hosted on a dedicated environment, often within their own data center. Then there's hybrid cloud, which lets enterprises select from on-premises, private and public cloud environments as needed. With hybrid cloud, organizations have the flexibility to optimize performance, security and compliance based on their specific needs.

In search of a flexible operating environment

IT leaders reported clearly that hybrid cloud strategies are superior to non-hybrid approaches at offering their enterprises a flexible mix of solutions and paths to the cloud: 57% of hybrid cloud users said their strategy was effective on this front, while only 50% of non-hybrid users could make the same claim (see Chart 9). The numbers are even more pronounced for users of hybrid cloud (on-premises, private cloud and public

cloud): 60% of adopters said their strategy was successful at creating flexibility in the enterprise. That same percentage was reported by users of multi-cloud. Similarly, 57% of users of both private and public cloud services (multi-cloud) reported a high degree of flexibility (see Chart 10). The numbers fall off with respondents who reported unilateral approaches to architecture, with 37% of on-premises-only users reporting flexibility in their operations.

Chart 9: What has your current cloud strategy been most successful at helping you achieve so far?

Offering a flexible mix of solutions and paths to the cloud
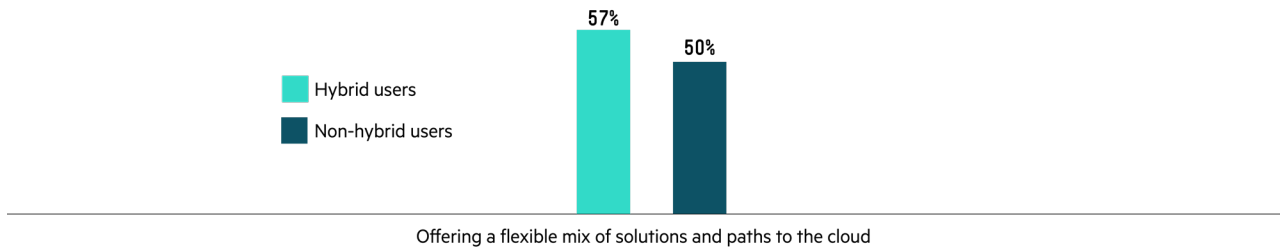
Quantitative research - base size: hybrid users (n=837), non-hybrid users (n=82)

Chart 10: Percent who said their current strategy is successful at achieving: "offers a flexible mix of solutions and paths to the cloud"
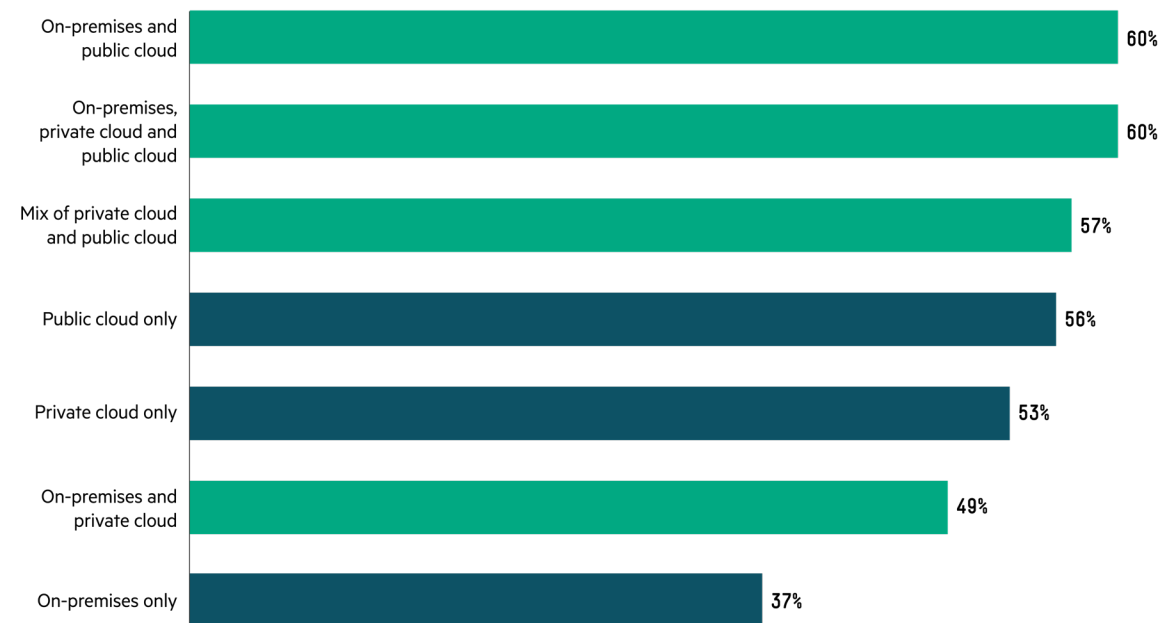
Quantitative Research–base size: Private cloud only (n=36*), On-premises and public cloud (n=108), On-premises and private cloud (n=140), On-premises private cloud and public cloud (n=285), Mix of private and public cloud (n=304), On-premises only (n=19*), Public cloud only (n=27*). *Indicates small base sizes; use directionally.

Hybrid cloud provides optimal flexibility

It makes logical sense that any hybrid approach would inherently improve organizational flexibility: the more environments available to run workloads, the more options you have to place each. Simple, well-understood applications such as messaging services are run on standard, public cloud environments. However, sensitive applications such as health records management and accounting services are run on private cloud or on-premises platforms, which are generally more secure or provide better compliance with regulations.

Hybrid cloud users reported that flexibility makes operations and various processes more streamlined and faster, ultimately increasing profits and revenue. It also helps them scale and automate processes.

Central to these concepts was the notion that hybrid cloud makes possible better integration between on-premises operations and the cloud. The upshot: hybrid cloud improves data safety, creates more efficiency, enhances cost effectiveness, increases redundancy and reduces the need for on-site staffing.

Driving the need for hybrid cloud

The flexibility of hybrid cloud is best exemplified by the comments IT leaders made about what drove their need to adopt this enterprise structure. For example, a CIO of a medium-sized enterprise in the US said performance and IP security are key: "Our business needs are mostly to avoid downtime and protect our data."

But for one CIO of a large US-based enterprise, the flexibility provided by hybrid cloud was most evident in the way it helped the organization reduce its levels of complexity. "From a pragmatic standpoint," they said, hybrid cloud helps to "minimize the number of moving parts in the enterprise." In other words: fewer on-premises equipment and staff needed to run it.

Rationales for implementing hybrid cloud vary greatly across the board. Another large enterprise CIO cited

Tech leaders share 9 keys to maximum flexibility

1. Accommodates different app requirements more effectively.

2. Offers flexibility to right-size the cloud environment to any task at hand.

3. Helps move data to the cloud from different tools and places.

4. Allows data to move more securely.

5. Delivers access to those who need it, where and when they need it.

6. Provides the ability to move data with minimal lag.

7. Offers the organization a way to do more with fewer resources.

8. Provides the ability to try out projects before committing to a specific environment.

9. Sets the stage for easier business growth.

the need for load balancing as the critical factor driving hybrid cloud adoption. And yet another CIO of a very large enterprise said the ability to create what-if scenarios and optimize capacity was the deciding factor.

Last, one medium-sized enterprise CIO in the US said the hybrid cloud was a natural result for the way the company had changed over the years. "Our company grew and became more diversified in its products and sophisticated in its business models," they said. "Our systems evolved with those changes, which meant our architecture evolved over time." For this respondent, hybrid cloud was an organic shift rather than an intentional one, but it proved its value through the flexibility it provided to the company.

Considerations when embarking on a hybrid cloud initiative

Proponents point out that hybrid cloud isn't a product; it's part of a digital transformation strategy that changes over time. To get started with a hybrid cloud strategy, begin with a thorough understanding of your organization's processes with an eye toward what needs to be prioritized and where each of those processes should live. A Cloud Business Office, as outlined in Chapter 4, can be of great help here, and seasoned consultants can help you with this type of evaluation and planning as well. Also, thorough testing will help you determine if each workload is operating in the ideal location.

Fight the urge to consolidate everything in one place because you think it will be easier to manage that way. As one CIO noted, "Keep it simple, stupid" is a great mindset, "but in this business, nothing is simple. Having everything in one place isn't possible anymore." ■

What drove the need for hybrid cloud?

"Performance. ... Our business needs are mostly to avoid downtime and protect our data, copyright issues."
– CIO, medium-sized enterprise, US

"From a pragmatic standpoint, internally our biggest drivers are ... getting our footprint down, minimizing the amount of moving parts."
– CIO, large enterprise, US

"Our company grew and became more diversified in its products and in its business models, and how we managed was more sophisticated. So our systems evolved, and that meant our architecture evolved over time."
– CIO, medium-sized enterprise, US

"Flexibilities ... load balancing."
– CIO, large enterprise, US

"Our existing production scheduling system didn't have the ability to do what-if scenarios or optimization of our capacity."
– CIO, very large enterprise, US

Chapter 7

How security is evolving as the cloud goes hybrid

For a long while, conventional thinking assumed cloud environments were less secure than on-premises ones. That mindset has changed, although not in the way most observers might expect. In this chapter, we delve into which cloud solutions are best for security and how hybrid approaches are impacting this critical discipline.

A leading security strategy emerges — unexpectedly

It may come as a slight surprise that survey respondents overwhelmingly rated private cloud as the most secure enterprise architecture (with 75% saying it provides the "right level of security"), followed by on-premises-only architecture (63%) (see Chart 11). Hybrid cloud's three-pronged approach of on-premises, private cloud and public cloud took the third spot at 60%, with public cloud close behind at 59%. Multi-cloud and on-premises combined with private or public cloud rounded out the rest of the options with ratings ranging from 49% to 56%.

Chart 11: Percent who said their current strategy is successful at achieving: "providing the right level of security"
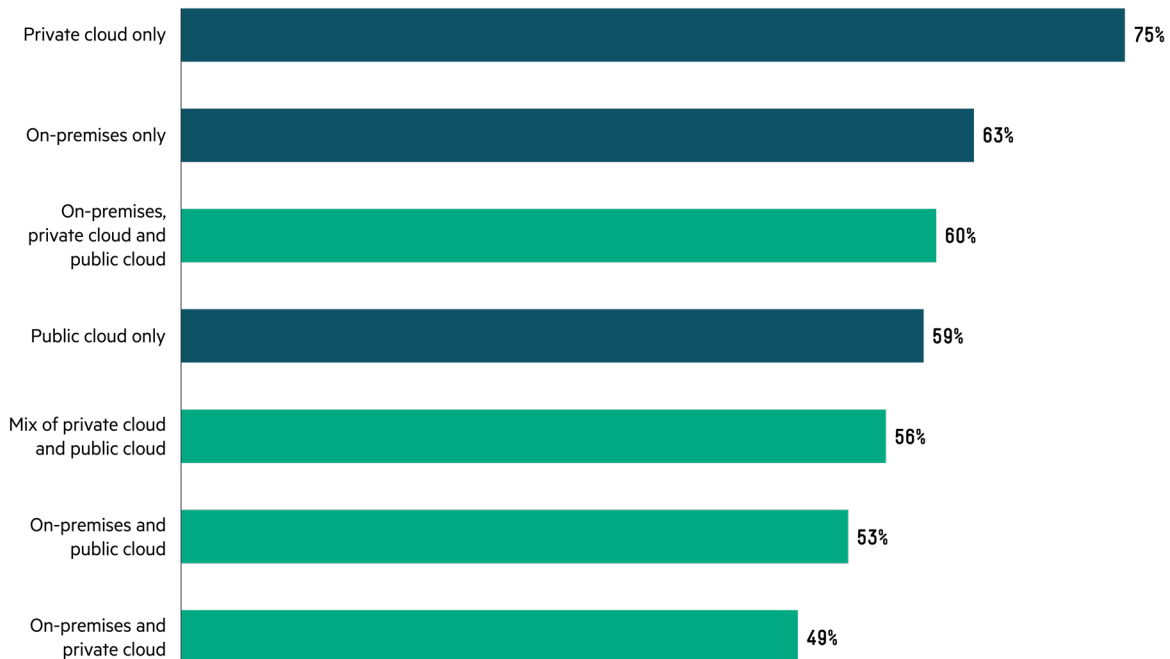
Category	Percent
Private cloud only	75%
On-premises only	63%
On-premises, private cloud and public cloud	60%
Public cloud only	59%
Mix of private cloud and public cloud	56%
On-premises and public cloud	53%
On-premises and private cloud	49%

Quantitative Research – base size: Private cloud only (n=36*), On-premises and public cloud (n=108), On-premises and private cloud (n=140), On-premises private cloud and public cloud (n=285), Mix of private and public cloud (n=304), On-premises only (n=19*), Public cloud only (n=27*). *Indicates small base sizes; use directionally.

What's going on here?

Logic dictates that security goes hand in hand with simplicity: the larger the number of discrete environments you must manage, the more resources you must leverage in securing them. Because security operations skills don't necessarily transfer from on-premises to cloud environments, or from one cloud platform to another, it is understandable technologists feel hybrid environments are by definition somewhat harder to secure.

Cloud platforms are increasingly considered some of the most secure operating environments, which also reflects the growing popularity of outsourcing the enterprise's security operations. Public cloud makes it possible for enterprises to outsource security operations, removing accountability in a way that on-premises and hybrid cloud solutions can't match.

The security impact of hybrid cloud

One point survey respondents were careful to make is that security does not have a finish line. There is no such thing as having enough security. Instead, the question is how much risk you're comfortable with. While an exclusively private cloud environment may canonically be the "safest" option, the other benefits of hybrid cloud may outweigh the perception of increased security that private cloud provides.

This is not to say hybrid cloud is inherently insecure. Instead, it allows an organization the flexibility to implement different security levels for local data versus cloud-based data. On-premises data can be locked down to a deeper level, while cloud-stored workloads can have security outsourced to an expert provider. In addition, a hybrid cloud strategy can provide enterprises with the ability to spend less time monitoring security subsystems and more time focusing on the organization's business needs. Respondents also cited the ability to reduce compliance risk, by letting them keep some data on-premises and other data stored in the cloud.

This capability isn't possible with a monolithic cloud strategy. Additionally, VPNs can be used to reduce the risk of data being compromised while traveling between local or edge resources and the cloud. And hybrid cloud introduces redundancy to the operating environment, letting the enterprise develop a backup plan for critical workloads while minimizing downtime. In all these ways, hybrid cloud may add some level of overhead, but it does help to reduce various types of risk. It also gives an organization more time to focus on its business, which can mitigate some of the risk created due to loss of local control.

"Security is just an illusion"

Think you can ever have true enterprise security? "Security is just an illusion anyway," said one CIO of a large enterprise in the US, punctuating the idea that security and risk are two sides of the same coin. "As a HIPAA-covered entity, the security of my data that's not on-premises is a significant concern for me, and I've certainly had to ramp up my due diligence as we evaluate where our data is stored and how it gets there." Another CIO of a large enterprise in the US said, "In the cloud world, you can't get as granular with security controls as you can with on-premises workloads, so you do lose some control. For organizations that are totally risk averse, that might not be good. As your security complexities and your liability exposure grow, your risk grows with it. The takeaway is that we are all just simply increasing our cyber liability insurance."

"You can never have the perfect level of security," said the CTO of a large US-based enterprise. "It's constantly iterative, constantly evolving, and you eventually have to find the right level of security for your level of comfort."

What impact has the right level of security had on your business so far?

"We have been able to outsource to specialized providers, and this has freed up our team for other duties and learning, etc."
– Manager, very large enterprise, Australia

"We have very sensitive data that underpins our assets and overall business. Security is principal to us and has helped us develop new tools and projects as a result of a secure base."
– Director/VP, very large enterprise, UK

For hybrid cloud, security is a moving target

For hybrid cloud organizations, one of the key aspects of improving security is understanding that you can (and should) have different security postures for local data versus cloud-based data. On-premises data can be locked down with an incredible level of control, while cloud-stored workloads can have their security outsourced to a provider that may have more experience.

That said, survey respondents noted that no matter what your environment looks like, you should never underestimate attackers, who are overwhelming in numbers and often surprising in sophistication. If your enterprise is in the crosshairs, there's really no level of security — local or cloud-based — that can fully guarantee your protection. ■

Cloud vulnerability

"When things are in the cloud, your data has to move and it can be intercepted. You have to make sure that the tunnel you set up between your cloud and your prem is secure. Either it's a VPN, which a lot of the providers will provide as a service, or you can even set up a private tunnel. There's no outside traffic that hits your data. It's going to be a lot more expensive, but you have to understand what kind of data you're transmitting and is it worth the cost. It might be something that should stay very secure."

– CIO, very large enterprise, US

"If security and cost were no issue, everybody would probably just put everything in private. If security wasn't an issue, they might put it in public, put everything in somebody else's responsibility realm and paying is a service bill at the end of the day."

– CIO, large enterprise, US

"You have different security postures for the local dataset versus the one in the cloud. Include as many sources in your MDR (management detection and response) solution to make sure that you're covered both on-prem and in the cloud, or different tools and different logs and different ways of monitoring, is the way to go."

– CIO, medium-sized enterprise, US

"Transferring that risk. ... We outsource security to a cloud company on the basis that we think they're going to be able to do it better than we can, but we still need that coverage in some form basically. It's kind of a workforce extension for us, but it's also a workforce enabler in that just being able to let us focus on our strengths versus trying to do everything."

– CIO, large enterprise, US

Conclusion

What have we learned? Leading enterprise cloud decision-makers agree, hybrid cloud is the dominant operating model because it helps them open up new opportunities.

The benefits of hybrid cloud are significant. Hybrid cloud allows them to be more flexible, improves security and compliance, and provides an inherent level of reliability that other operating models can't. For organizations with legacy applications, hybrid cloud provides a platform upon which they can either maintain operations as is or migrate them to a cloud platform in time. Hybrid cloud users also report a variety of cost advantages over other operating environments.

Hybrid cloud provides an ideal environment for almost every organization to access and use all its data, no matter where it is located. It lets them control and harness edge data, and it gives them control over how all data is stored and processed. Hybrid cloud improves processing speed and makes possible a single source of truth, the key to turning data into intelligence. Last, hybrid cloud helps reduce risk and delivers an appropriate level of security. No matter how an organization begins its hybrid cloud journey, the results are clear: industry leaders today are choosing a hybrid cloud strategy because it's working. It is opening up new opportunities by speeding innovation, optimizing processes and setting the stage for business transformation. ■

Visit **HPE.com/GreenLake** ▭

💬 **Chat now (sales)**

Hewlett Packard Enterprise