

---

**MIT**  
**Technology**  
**Review**  
Insights

---

Produced in association with

**HITACHI**  
Inspire the Next

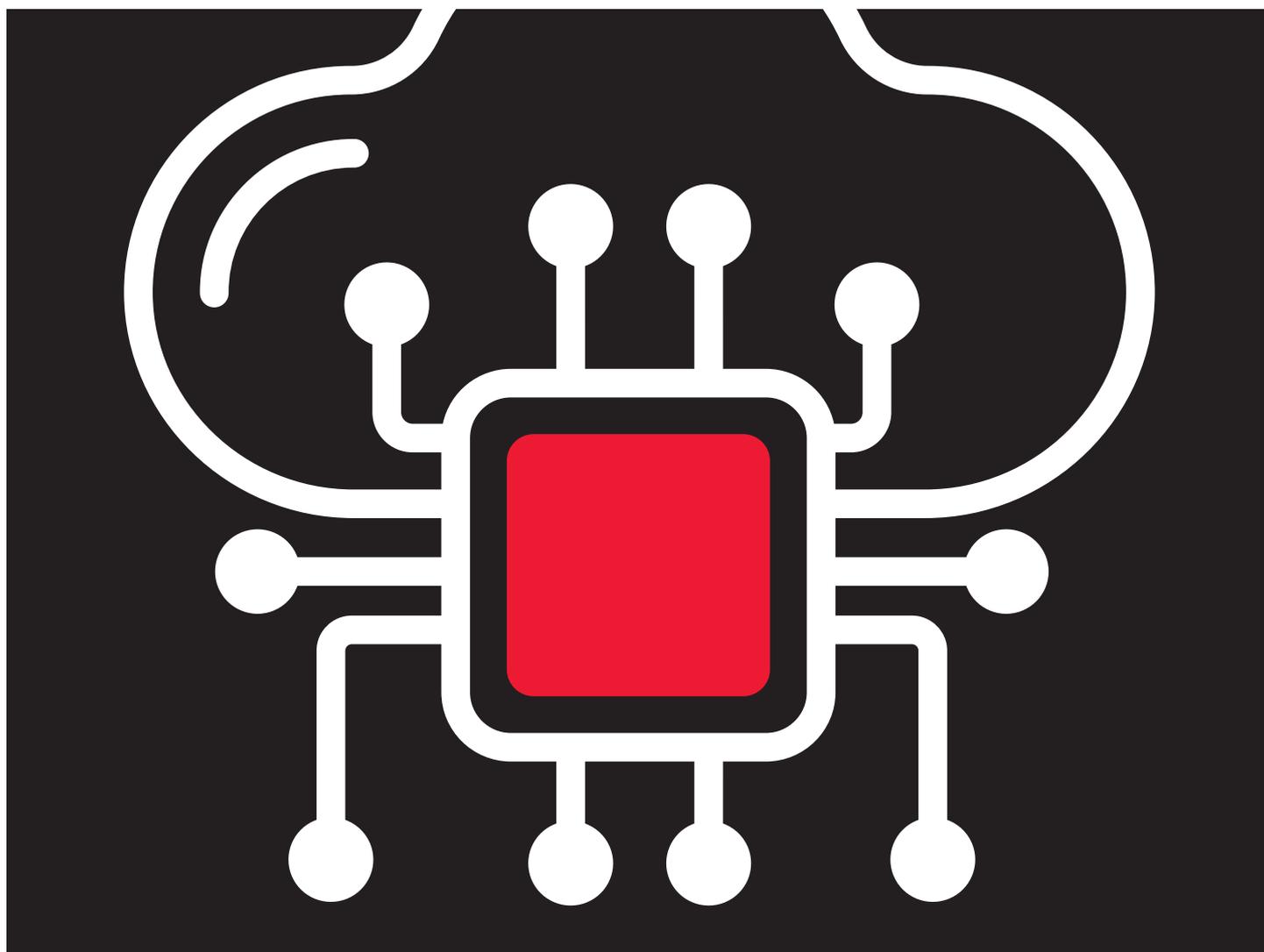
---

---

With the right planning and management tools,  
information technology teams can spur innovation,  
improve business efficiency, and further business growth.

# IT strategies for hybrid cloud

---

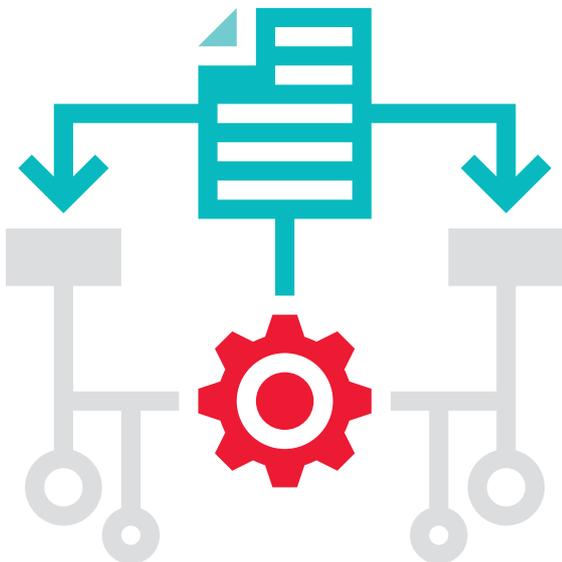


Scott Sinclair wants to debunk two myths associated with cloud computing. The first is that cloud is a zero-sum game in which apps that once ran in the data center are simply relocated to the public cloud, says Sinclair, senior analyst at market research outfit Enterprise Strategy Group (ESG). The second is the idea that eventually all applications will run in the cloud, and data centers will be phased out.

“Digital demands are increasing so much that, no matter how fast the cloud is growing, people are still investing in their data centers,” Sinclair says. In ESG’s latest research on data infrastructure trends, respondents report the average expected growth rate for data in the public cloud was a staggering 39% year over year! But that doesn’t mean that the amount of data stored on-premises is declining. In fact, the estimated growth rate for data centers is comparable – 35% year over year.

“If we think about a large modern enterprise, we may have two, three, four data centers; three, four, five public cloud providers; dozens, if not hundreds of edge locations,” says Sinclair. “And we have data moving and apps moving everywhere all the time.”

For example, the London Stock Exchange Group (LSEG) has dozens of data centers, hundreds of applications, and a presence in Amazon Web Services, Google Cloud, and Microsoft Azure, according to Nikolay Plaunov. He’s a director and technologist in the infrastructure and cloud division of LSEG, the diversified company that runs the stock exchange and also provides data-based financial services. Its portfolio includes virtualized applications running on-premises, containerized apps running in the cloud, and legacy apps running on mainframes.



## Key takeaways

- 1 Shifts to cloud computing – due in part to pandemic-driven remote work and fast-growing online shopping – have many organizations spreading their information technology environments across on-premises infrastructure and public cloud services.
- 2 Hybrid cloud infrastructure has promising potential, increasing efficiency, for example, speeding innovation, and accelerating time to market. But management challenges such as compatibility with legacy equipment, cybersecurity concerns, and the high cost of moving data can spell trouble for chief information officers.
- 3 To glean the benefits of a hybrid cloud environment, organizations need a tailored management plan that takes into account time, risk, cost, and value.

“What is really hitting people today, versus probably five or 10 years ago, is this idea of, ‘I have these things in my data center, and I have these things I’ve moved to the public cloud and I need to manage a lot more things,’” adds Sinclair. “Now, I’m living in a world where not only do I have to manage a lot more things, but I am constantly dealing with data and apps moving in all directions.”

One of the most significant effects of the 2020 coronavirus pandemic from an information technology

“Now, I’m living in a world where not only do I have to manage a lot more things, but I am constantly dealing with data and apps moving in all directions.”

Scott Sinclair, Senior Analyst, Enterprise Strategy Group

(IT) perspective has been the sudden, unplanned migration of applications to the cloud, as organizations moved quickly to accommodate remote workers and the surge of online shoppers. Today, companies find themselves with one foot in the cloud and the other still in the on-premises world, facing significant challenges in terms of how to manage this mixed IT environment, how to secure it, and how to keep costs under control.

A hybrid cloud IT infrastructure, in which resources are distributed across on-premises, private cloud, and public cloud environments, enables companies to accelerate time to market, spur innovation, and increase the efficiency of business processes. And companies are keen on its promises: more than a third (37%) say hybrid is an investment priority over the next year and a half, according to a 2021 ESG survey of 372 IT professionals.<sup>2</sup>

But the complexity of managing a hybrid cloud presents challenges that can bedevil chief information officers, including compatibility with legacy equipment, cybersecurity concerns, and cost issues associated with moving data and managing data access.

To successfully manage a hybrid cloud environment, organizations need a specially designed hybrid cloud management plan that includes the right tools and strategies. These approaches can be as varied as the types of businesses out there, but some guidelines apply across industries – the need for a central control plane, for example, using automation to manage IT operations, and transitioning from managing infrastructure to managing service-level agreements with vendors.

### It all starts with applications

Russell Skingsley, chief technology officer for digital infrastructure at Hitachi Vantara, says most customers started their cloud journeys with somewhat unrealistic expectations. They initially believed that all apps would eventually end up in the cloud.

What they're finding is "there are things we can move, there are things we might move, and there are things we definitely can't move," Skingsley says.

Sinclair adds that while the rising tide is certainly lifting enterprise apps from the data center to the public cloud, there's a countercurrent in which organizations are moving some applications from the cloud back to the data center. Some of the reasons cited by organizations



## The benefits of a hybrid cloud

**A hybrid cloud allows organizations to get the best of both the traditional on-premises world and the public cloud.**

### Flexibility

Hybrid cloud systems allow organizations to use private cloud or on-premises resources when it makes sense, and draw on additional resources from the public cloud when needed.

### Cost

Public cloud resources and services are variable expenses and allow users to choose to run workloads in the most cost-effective environment.

### Agility and scalability

A hybrid cloud makes it easier to scale resources to meet demand spikes and move applications into the public cloud for extra scale when demand exceeds on-premises capacity.

### Compliance

Organizations in regulated industries often can't move certain workloads to the public cloud. With a hybrid approach, they can keep sensitive data private and move other data to and from the cloud.

## Organizations need to set up a systematic methodology that analyzes each application, decides which ones to move to the cloud, which ones to re-factor or rewrite, and which to keep on-premises.



speak to the complexity of hybrid cloud management: these include data sensitivity, performance, and availability requirements.

To effectively move applications to the public cloud, organizations need to set up a systematic methodology, almost a factory-style assembly line that analyzes each application in its portfolio and then decides which ones to “lift and shift” as-is to the cloud, which ones to re-factor or rewrite to take full advantage of the cloud, and which to keep on-premises.

The first step is conducting an inventory of the application portfolio. This can help organizations eliminate duplication and identify apps that no longer

serve a business purpose and can be de-commissioned. The next step is to analyze applications through the lens of business outcomes. Then, organizations need to make decisions based on factors like time, risk, cost, and value.

At London Stock Exchange Group, Plaunov is constantly balancing cost with business criticality. Every application is different and requires its own specific calculation. “I’ve seen several applications that were lifted and shifted to the cloud, and in some cases, it’s relatively simple to optimize them and to optimize their costs.” In other cases, it can be expensive to convert a monolithic app to the public cloud because it entails breaking the app into smaller components.

The company’s risk management team analyzed its application portfolio and identified 14 high-priority apps in one of the business units. “If the application is business-critical and yet is running on obsolete infrastructure, then it’s an obvious choice to do something about it. And if you’re already budgeting for some changes to an application, if there are no regulatory or technological limits, then it’s a candidate to go to the public cloud.”

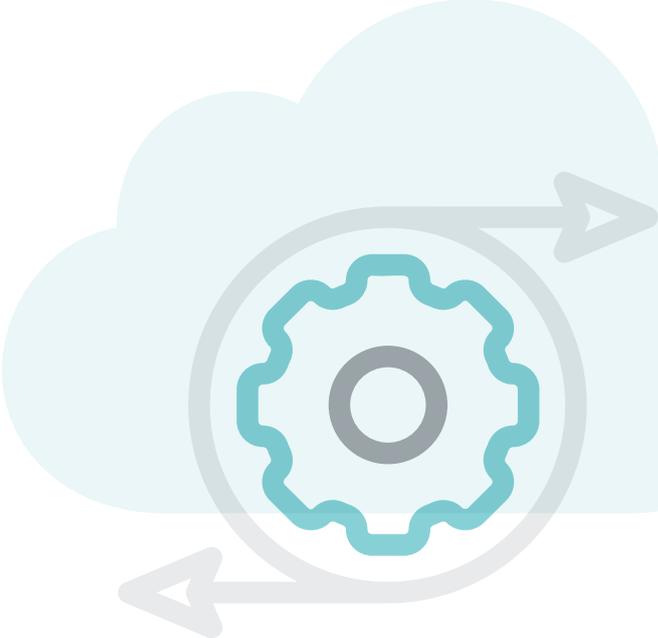
As more businesses deploy more internet-connected devices and sensors, they find themselves performing initial processing of some data at the edge, then moving relevant data to the cloud or a data center. Organizations need to deploy a data strategy that determines which data should be processed where, and how to most efficiently move data between nodes.

Ultimately, a hybrid cloud needs to become a flexible, resilient fabric that can accommodate shifting business requirements and react on the fly, handle spinning up new application instances as needed, with the underlying storage resources that provide data processing and analytics automatically responding to the business needs, says Skingsley.

## Hybrid vs. multi-cloud

**A hybrid cloud combines internal infrastructure with an external cloud service. Multi-cloud involves multiple cloud services with separate management tools.**

HYBRID CLOUD	MULTI-CLOUD
<b>DIFFERENCES</b> Includes both private and public clouds that are typically managed together.	Includes several public cloud services that perform different functions.
<b>CHALLENGES</b> Integrating public and private clouds is complicated.	Multiple cloud environments present security complexities for users and business data.
<b>BENEFITS</b> A hybrid cloud strategy boosts business agility by supporting rapid infrastructure changes and workload testing.	A multi-cloud strategy removes the burden of hardware, software, maintenance, and support.



## Optimizing cloud costs with FinOps

While there are specific cost-optimization tools for the cloud, many companies are taking a more strategic approach called **FinOps**. With FinOps, organizations bring together financial, business, and technical teams to build a cost-conscious culture.

Typically, FinOps entails an initial assessment of cloud costs in relation to business needs, followed by the development of cloud cost management and optimization strategies. The final step is implementing the recommendations with as much automation as possible.

### Don't sleep on the data center

Many organizations, when thinking about where to invest their IT dollars, look at data centers as a legacy graveyard or as sunk costs. But Sinclair cautions that an organization's failure to update the data center represents a missed opportunity.

Many companies do a cost analysis and compare the current cost of cloud services versus the cost of on-premises technology they bought five years ago, "not realizing that on-premises costs have dropped significantly in that timeframe."

For example, not only have costs decreased considerably for a gigabyte of raw storage, but more efficient data center technologies, such as high-density block storage, can reduce the data center footprint while providing advanced analytics that creates business value. Similarly, on the server side, central processing units are getting more powerful, and technologies such as virtualization and containerization enable data center servers to handle more workloads on less hardware while boosting agility and resiliency.

In its application infrastructure study, one of the trends ESG identified is this: data center requirements are not only increasing but also shifting from a centralized to a more distributed model. When asked how many data centers they expected to have five years from now, 89% of organizations with at least 2,500 employees reported they anticipate they will have more than 10 data centers, and only 12% said they planned to eliminate data centers (see figure, right).<sup>3</sup>

Data center modernization creates opportunities for organizations to develop private clouds. According to the ESG survey, 46% of respondents report they plan to invest in private cloud technology, which Sinclair describes as "cloudifying" the data center by adding cloud-like experiences such as self-service.

## New takes on traditional IT

Most organizations aren't getting rid of their data centers – they're modernizing them, including integrating cloud infrastructure and adding a "cloud-like" feel.

IMPROVE INTEROPERABILITY WITH PUBLIC CLOUD	50%
REDUCE ON-PREMISES INFRASTRUCTURE WHEN FEASIBLE	49%
INVEST IN TECH THAT PROVIDES A CLOUD-LIKE EXPERIENCE	46%
GET OUT OF THE DATA CENTER BUSINESS	12%
MAINTAIN EXISTING DATA CENTER FOOTPRINT	9%

Source: ESG's "Application Infrastructure Modernization Trends across Distributed Cloud Environments," based on a survey of 372 IT professionals conducted in September 2021

He sums it up this way: “If you’re not modernizing your data center, then you’re not getting those operational gains that can free up personnel to do other things.”

### Security challenges in a hybrid cloud

One of the complexities associated with a hybrid cloud is simply understanding that while platforms like AWS or Azure can be as secure as any data center, they do require different skill sets, data governance processes, and security models. For example, one common vulnerability is IT employees misconfiguring and exposing Amazon data volumes.

Plaunov agrees, noting that AWS is certified for the highest cybersecurity standards “as long as you configure it properly and limit connectivity to recommended levels.”

Organizations implementing a hybrid cloud need to pay special attention to data classification, data encryption, and other ways of protecting data in motion and at rest. And having data in multiple cloud environments makes matters even more complicated, says Skingsley.

For example, LSEG has implemented tools such as Web application firewalls to analyze traffic moving back and forth between the cloud and the enterprise network.

Donna DeMarco, co-founder and vice president of Viddler, a cloud application for corporate videos, says security is a prime concern for her customers.

Companies, primarily health-care organizations, hire Viddler as their video training and engagement platform. The videos range from a message from the CEO to updates on new products and services to congratulating an employee for a work anniversary. They’re uploaded and stored on Viddler’s servers in the AWS cloud, then streamed via a third-party content delivery network to employees who can access the videos from any location via single sign-on.

Since most of DeMarco’s clients are in health care, she says compliance with the Health Insurance Portability and Accountability Act, the US health data law, is a big issue. When Viddler onboards a new client, it works with the customer’s IT team to complete a full security audit.

“They want to know where our data center is. What’s our disaster recovery plan? Just to make sure that we’re a stable organization, and what our security plans are, how do we do backups?” DeMarco says. “Once we pass that, we’re good to go.”

When it comes to data privacy, the customer’s human resources department maintains control of sensitive user information, while Viddler provides data analytics to verify that a person watched the video.

### The cost equation across storage and applications

A lot of early adopters of public cloud computing went into it thinking that everything would be cheaper, says Skingsley. “But what they found is that some things are, and some things aren’t.”



“You might want to get your compute from Amazon, Google, Azure, whatever, but chances are you’re going to want to keep a lot of your mission-critical data on premises.”

Russell Skingsley, Chief Technology Officer, Digital Infrastructure, Hitachi Vantara

“We’re trying to automate things to a degree where the user can just say, almost like in plain English, ‘I need this application to talk to that application,’ and everything else is automatically configured and you can start using it.”

Nikolay Plaunov, Director and Technologist, Infrastructure Architecture,  
London Stock Exchange Group

For example, one of the touted benefits of a hybrid cloud is being able to burst workloads to the cloud in response to a spike in demand, then scale down when the spike ends. “That works well for compute, but it works horribly for storage,” explains Skingsley, since data storage isn’t “bursty” the way an application is; it’s a constant that’s constantly growing.

“Storing data long-term in the cloud has turned out to be uneconomical for a lot of people,” Skingsley says. “You might want to get your compute from Amazon, Google, Azure, whatever, but chances are you’re going to want to keep a lot of your mission-critical data on-premises,” Skingsley says.

To further complicate the storage scenario, many organizations are doing transactions closer to the customer and pre-processing data at the edge, then performing the heavy-duty analytics in the data center. So organizations need to create a seamless, highly automated fabric that protects, moves, and processes data at the appropriate location.

Similarly, on the applications side, organizations need to conduct a cost-benefit analysis that compares the true cost of running an application in the cloud with the cost of running it in a modernized private cloud, rather than what the cost might have been when the app was deployed on outdated infrastructure. “I don’t think people truly understand how much they’re spending, or how much more they’re spending than they could have been,” says Sinclair.

Application development is another example. Sinclair points out that when developers had to wrangle computational resources from the IT staff, it was relatively easy for IT to keep track of the resources being used. But when developers are free to spin up server

instances across multiple public cloud platforms, build container-ized applications, and deploy microservices, it’s difficult to determine whether they have provisioned more resources than they need.

### Piecing together the hybrid puzzle

Managing a hybrid cloud infrastructure is no easy feat, but it’s a fundamental building block in any company’s digital transformation as it pursues new business opportunities and innovation. And complexity can be reined in with the right level of automation.

“In most cases, it’s the capability of the platform that drives innovation,” says Plaunov. On the public cloud side of hybrid, automation is fairly straightforward. If there’s an issue with an application that was built in the cloud, then changes can be made quickly “without thinking about procuring new servers.”

Automating the private side of the equation has historically been knottier – but technological advancements are changing that. “We’re trying to automate things to a degree where the user can just say, almost like in plain English, ‘I need this application to talk to that application,’ and everything else is automatically configured and you can start using it,” Plaunov says. “That’s where we’re trying to get to.”

To achieve the business benefits of a hybrid cloud, organizations need to modernize their applications, data, and infrastructure in a coordinated manner that optimizes business processes and enables automated management of resources wherever they’re located. As Skingsley puts it, “Hybrid cloud is just another way of saying evolved IT architecture.”



## Key recommendations for managing a hybrid cloud

Administering hybrid's multiple environments and components can be complicated, but fortunately, several tools and strategies exist to make IT admins' lives easier.

### 1. Develop a hybrid plan.

Organizations need a comprehensive strategy for managing private and public cloud resources. To mitigate complexity, the plan should emphasize the use of automation.

### 2. Take a data-first approach.

When it comes to decisions on where to locate resources in a hybrid cloud scenario, rotate environments around data, not data around environments.

### 3. Rationalize your applications portfolio.

Conduct an assessment of existing apps to determine which ones to migrate to the cloud, which to keep in the data center, and which to de-commission.

### 4. Implement CI/CD.

Unless an organization has implemented continuous integration/continuous delivery (CI/CD) and automated testing of new or refactored apps, the advantages of cloud-based applications could be negated.

### 5. Eliminate silos.

Organizationally, companies need to eliminate data silos and encourage collaboration between cloud, data center, application development, storage, and security teams.

### 6. Find the right technology partner.

For companies facing a skills gap, teaming up with a third party can help avoid the pitfalls, take advantage of best practices, and develop a customized approach that will deliver the benefits of a hybrid cloud for the business.

“IT strategies for hybrid cloud” is an executive briefing paper by MIT Technology Review Insights. It is based on research and interviews conducted in November and December 2021. We would like to thank all the participants as well as the sponsor, Hitachi Vantara. MIT Technology Review Insights has collected and reported on all findings contained in this paper independently, regardless of participation or sponsorship. Jason Sparapani, Sonia Rubeck, and Laurel Ruma were the editors of this report, and Nicola Crepaldi was the publisher.

## About MIT Technology Review Insights

MIT Technology Review Insights is the custom publishing division of MIT Technology Review, the world’s longest-running technology magazine, backed by the world’s foremost technology institution – producing live events and research on the leading technology and business challenges of the day. Insights conducts qualitative and quantitative research and analysis in the US and abroad and publishes a wide variety of content, including articles, reports, infographics, videos, and podcasts. And through its growing MIT Technology Review Global Insights Panel, Insights has unparalleled access to senior-level executives, innovators, and entrepreneurs worldwide for surveys and in-depth interviews.

## From the sponsor

### **Hitachi Delivers Expert Guidance, Expert Results.**

Hitachi Vantara, a wholly-owned subsidiary of Hitachi, Ltd., guides our clients from what’s now to what’s next by solving their digital challenges – accelerating their cloud, applications, and data. Working alongside each client, we apply our unmatched industry and digital capabilities to their data and applications. More than 80% of the Fortune 100 trust Hitachi Vantara to help them develop new revenue streams, unlock competitive advantages, lower costs, enhance client experiences, and deliver social and environmental value. Visit us at [www.hitachivantara.com](http://www.hitachivantara.com).

**HITACHI**  
Inspire the Next

### References

1. Scott Sinclair, “ESG Master Survey Results: 2021 Data Infrastructure Trends,” Enterprise Strategy Group, September 8, 2021.
2. Rob Strechay and Scott Sinclair, “Application Infrastructure Modernization Trends across Distributed Cloud Environments,” Enterprise Strategy Group, December 2021, 18.
3. Rob Strechay and Scott Sinclair, “Application Infrastructure Modernization Trends across Distributed Cloud Environments,” 15-16.

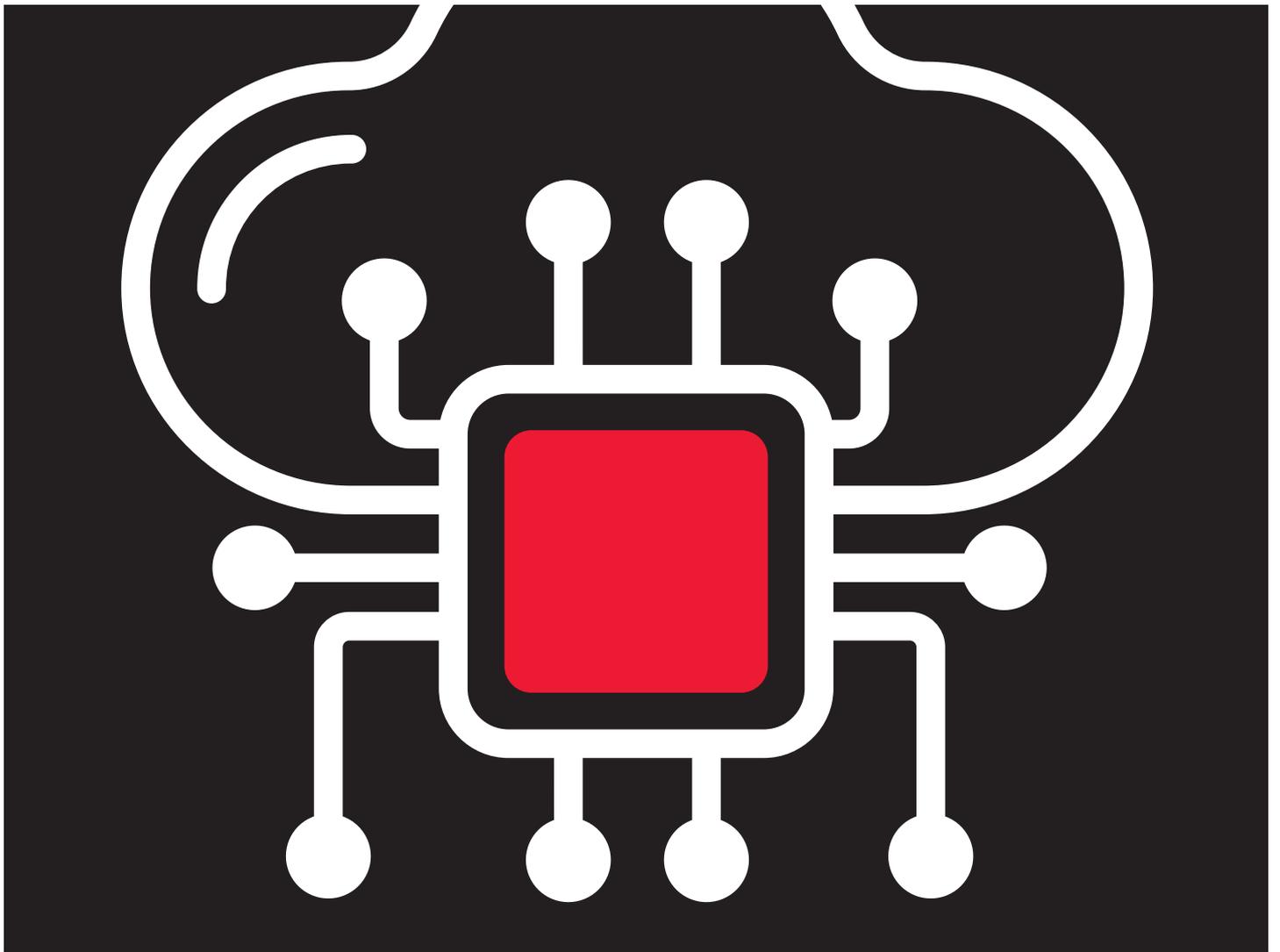
---

### Illustrations

Cover art and spot illustrations created by Chandra Tallman with icons by The Noun Project.

*While every effort has been taken to verify the accuracy of this information, MIT Technology Review Insights cannot accept any responsibility or liability for reliance on any person in this report or any of the information, opinions, or conclusions set out in this report.*

© Copyright MIT Technology Review Insights, 2022. All rights reserved.



## MIT Technology Review Insights

 [www.technologyreview.com](http://www.technologyreview.com)

 @techreview @mit\_insights

 [insights@technologyreview.com](mailto:insights@technologyreview.com)