

# Multicloud in the Mainstream

Making IT Work 'As Advertised'



## Discovery Report

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451 Research

**S&P Global**  
Market Intelligence

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## About this paper

A Discovery paper is a study based on primary research survey data that assesses the market dynamics of a key enterprise technology segment through the lens of the “on the ground” experience and opinions of real practitioners — what they are doing, and why they are doing it.

# About the Author



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Melanie Posey is the Research Director for the Cloud & Managed Services Transformation channel at 451 Research, a part of S&P Global Market Intelligence. In addition to managing the research team, she focuses on analyzing the evolution of enterprise IT through the lens of cloud and the associated transformation of IT consumption and delivery models. Melanie also manages 451 Research’s Voice of the Enterprise: Cloud, Hosting & Managed Services offering.

Prior to joining 451 Research, Melanie spent more than 15 years at IDC in a variety of roles, providing analysis, forecasting and insight for the cloud, hosting, datacenter, managed services and telecommunications markets. At IDC, Melanie received numerous awards for research, collaboration, sales support and client service, including being named runner-up for the prestigious James Peacock Memorial Award.

During her more than 20-year career in the technology research and consulting arena, Melanie has been quoted extensively in the business and technology trade press, and is a frequent speaker at industry and client events.

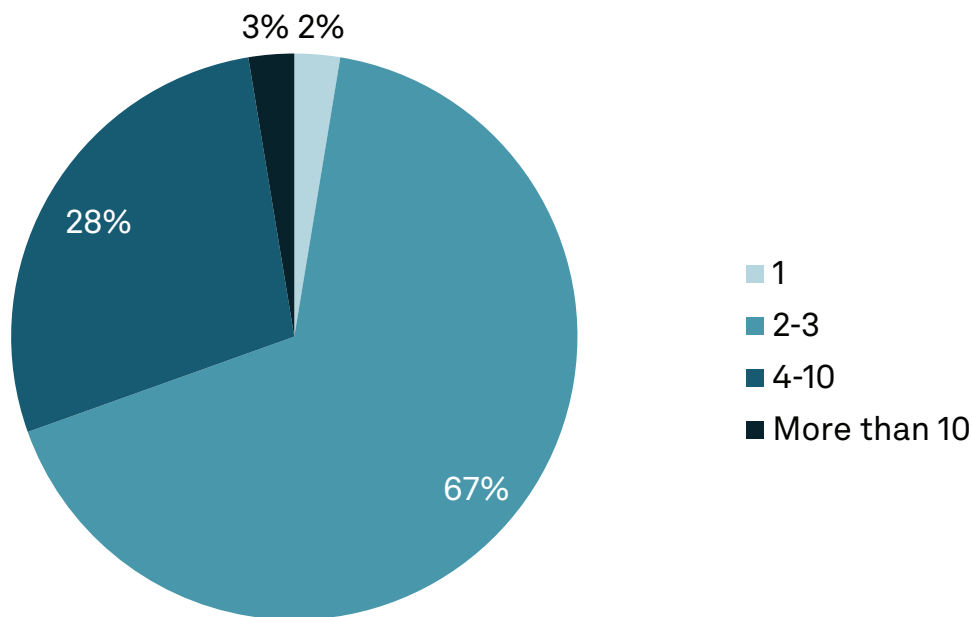
Melanie holds an MA in international relations/international economics from the Paul H. Nitze School of Advanced International Studies (SAIS), a division of Johns Hopkins University, an MA in political science from the University of Michigan, Ann Arbor, and a B.A. in French from Amherst College.

# We're Living in a Multicloud World — How Did We Get Here?

Cloud is no longer a separate category of IT; quite simply, it *is* IT. The consumption-based, as-a-service-driven cloud operating model is taking hold across the IT landscape, giving organizations choices for how they procure, deploy, integrate, manage and transform their digital infrastructure stacks. Along the way, the “either/or” IT binaries of public vs. private cloud and on-premises vs. off-premises gave way to convergence, with multicloud and hybrid IT estates spanning private and public cloud environments, as well as multiple cloud vendors.

Nearly all of the enterprises surveyed are multicloud — using more than one provider for public cloud-delivered infrastructure (IaaS/PaaS) and/or applications (SaaS) (see Figures 1 and 2).

**Figure 1: Number of cloud infrastructure providers (IaaS/PaaS)**

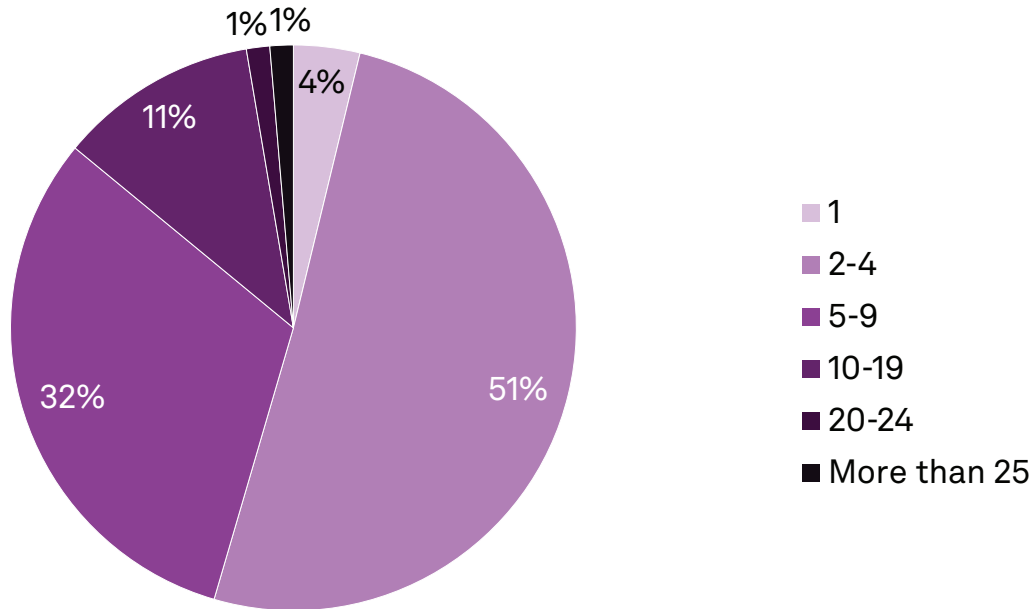


Q. How many IaaS/PaaS public cloud providers (such as AWS, Azure, Google Cloud Platform [GCP], etc.). do you use/plan to use in your IT environment?

Base: Organizations currently using or planning to use IaaS/PaaS within the next six months (n=1,500).

Source: 451 Research custom survey commissioned by Oracle, Q3 2022.

Figure 2: Number of cloud application providers (SaaS)



Q. How many SaaS providers (such as Workday, Zoom, Salesforce, etc.) do you use/plan to use in your organization?

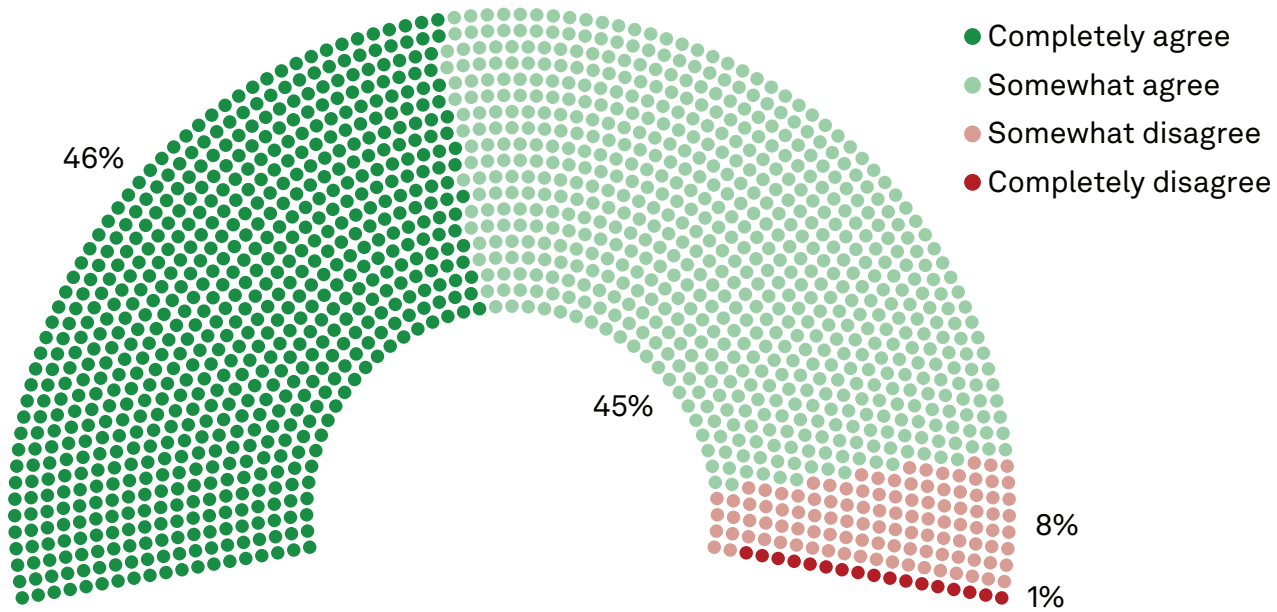
Base: Organizations currently using or planning to use IaaS/PaaS within the next six months (n=1,425).

Source: 451 Research custom survey commissioned by Oracle, Q3 2022.

The COVID-19 pandemic raised the profile of cloud infrastructure and services, which provided the flexibility and scalability needed for rapid digitization of business models and processes<sup>1</sup>. According to a 451 Research survey commissioned by Oracle, 90% of enterprises agreed that the pandemic was a significant driver of multicloud usage (see Figure 3).

1. Nearly one-third of organizations reported the greater reliance on cloud-based services would be a permanent feature of their post-COVID-19 IT environments (451 Research's Voice of the Enterprise, Digital Pulse, Coronavirus Flash Survey, October 2020).

Figure 3: COVID-19 pandemic has been a driver of multicloud use



Q. Please rate your level of agreement with the following statement: "The COVID-19 pandemic has been a significant driver of my organization's use of multicloud."

Base: Organizations currently using or planning to use IaaS/PaaS within the next six months (n=1,447).

Source: 451 Research custom survey commissioned by Oracle, Q3 2022.

These trends have been developing for some time, but enterprises and vendors are showing new interest (and investment) in taking things to the next level — enabling seamless, integrated multicloud experiences. At this point, key questions arise. Do multicloud architectures currently work "as advertised," offering the benefits of business agility, resiliency and cost optimization, or is there still work to be done? How do enterprises achieve flexible and scalable application deployment? Who can deliver on the promise of unified customer experience across multiple environments and diverse back-end architectures?

# The Whys and Wherefores of Multicloud: The Best of All Worlds

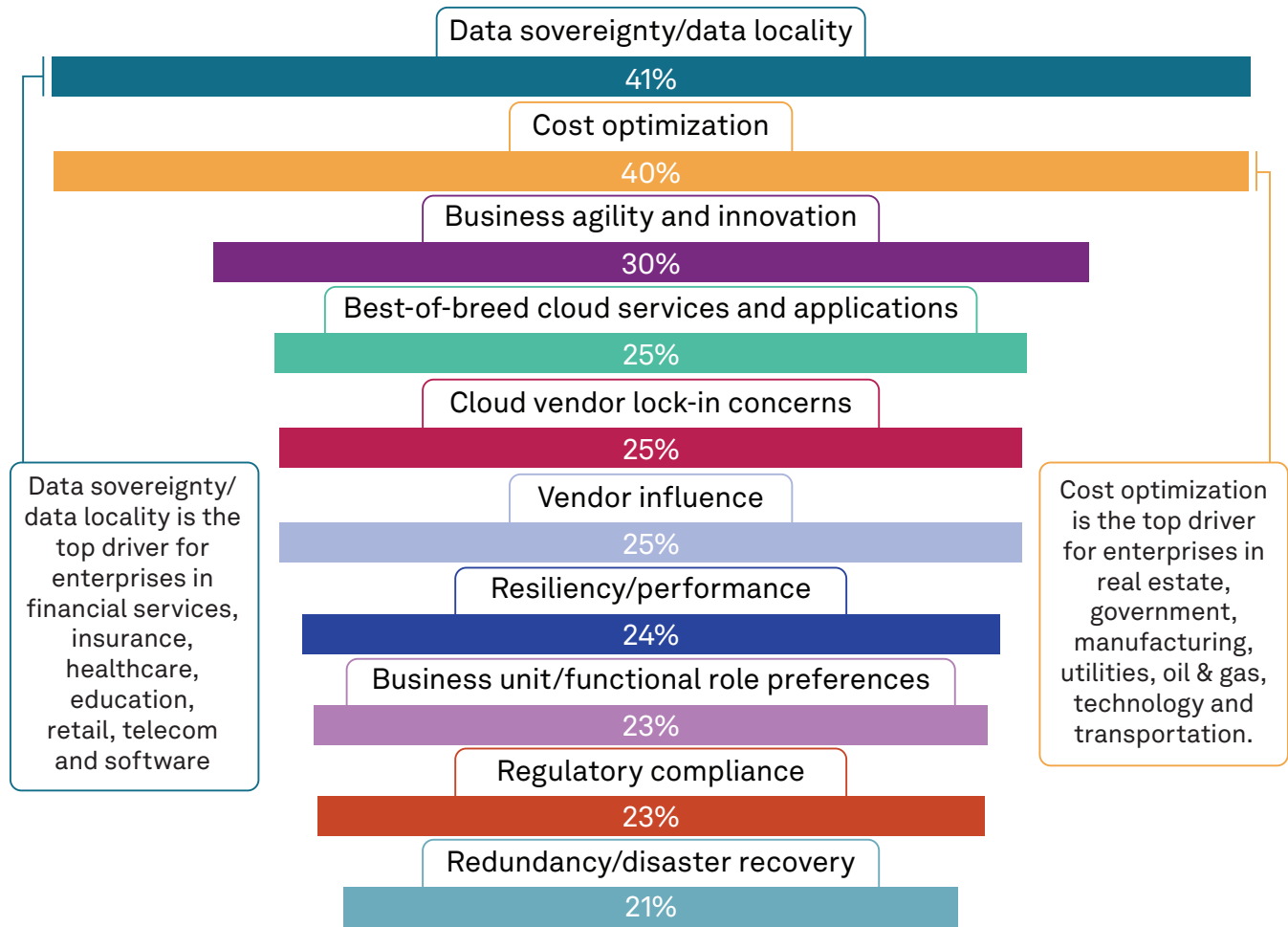
IT heterogeneity is not new. On-premises enterprise IT environments have always been heterogenous, featuring multiple server, storage and networking suppliers, as well as a variety of infrastructure and application software vendors and service providers supplementing in-house IT personnel. As a result, monolithic technology stacks, lock-in, “swivel chair” tooling and systems management, and limited collaboration among vendors were common features of the pre-cloud IT landscape.

The cloud world is no different. Whether by default or by design, enterprise IT environments are multicloud (as well as hybrid) due to various business considerations, IT operations issues, workload characteristics and financial requirements. Multicloud provides a solution for enterprises looking to serve various stakeholders with the right public cloud infrastructure for their specific needs. According to 451 Research, multicloud is here to stay: More than half of organizations currently using multiple clouds have taken a multicloud approach by design, and nearly two-thirds indicate a continuing preference for multicloud as an IT design principle.<sup>2</sup> Just as one size does not fit all when it comes to on-premises IT, this is also the case for public cloud infrastructure. As a result, enterprises see a range of benefits in multicloud, with the prominence of certain drivers varying by industry, organization role and other vectors. As illustrated in Figure 4, data sovereignty (i.e., the idea that the data organizations use is subject to the legal and regulatory regimes of the localities where it is collected, stored and analyzed) is the most frequently cited multicloud motivator, followed closely by cost optimization and, more distantly, by business agility and innovation.

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2. 451 Research, part of S&P Global Market Intelligence, IaaS/PaaS Public Cloud Provider Selection: What Matters? 2022

Figure 4: Most significant motivators: What's driving multicloud?



Q. What are the most significant motivations for your organization's use of multiple public clouds? Select up to three.

Base: Organizations currently using multiple public cloud IaaS/PaaS providers (n=1,461).

Source: 451 Research custom survey commissioned by Oracle, Q3 2022.

Sector-specific factors also drive organizations toward multicloud. Business agility and innovation are especially important for enterprises in telecom (38%), retail (33%), financial services (32%) and government (30%). Accessing best-of-breed cloud services and applications is a key factor for enterprises in healthcare (33%) and financial services (31%). Vendor lock-in concerns are particularly important for organizations in financial services (32%), technology (31%) and telecom (32%). Concentration risk related to vendor lock-in has regulatory and risk implications in these industries.

The importance enterprises attach to data (which is the fuel that powers business applications) highlights an issue often overlooked in enterprise decision-making about public cloud. While infrastructure is the foundational support for the execution of business operations, the components of various workflows may not all reside in the same IT environment. Cloud-native technologies facilitate abstracted infrastructure and application stacks; the multicloud approach complements business agility and innovation by enabling “cloud anywhere” flexibility.

The drivers for multicloud can be categorized into two broad groupings:

**Defensive** — i.e., intended to guard against pricing or total-cost-of-ownership shifts, vendor lock-in, regulatory compliance and business continuity interruptions.

**Offensive** — i.e., to enable best-of-breed cherry-picking of services across cloud providers, leverage incentives and functionality offered by existing strategic vendors, and empower internal stakeholders to use their clouds of choice.

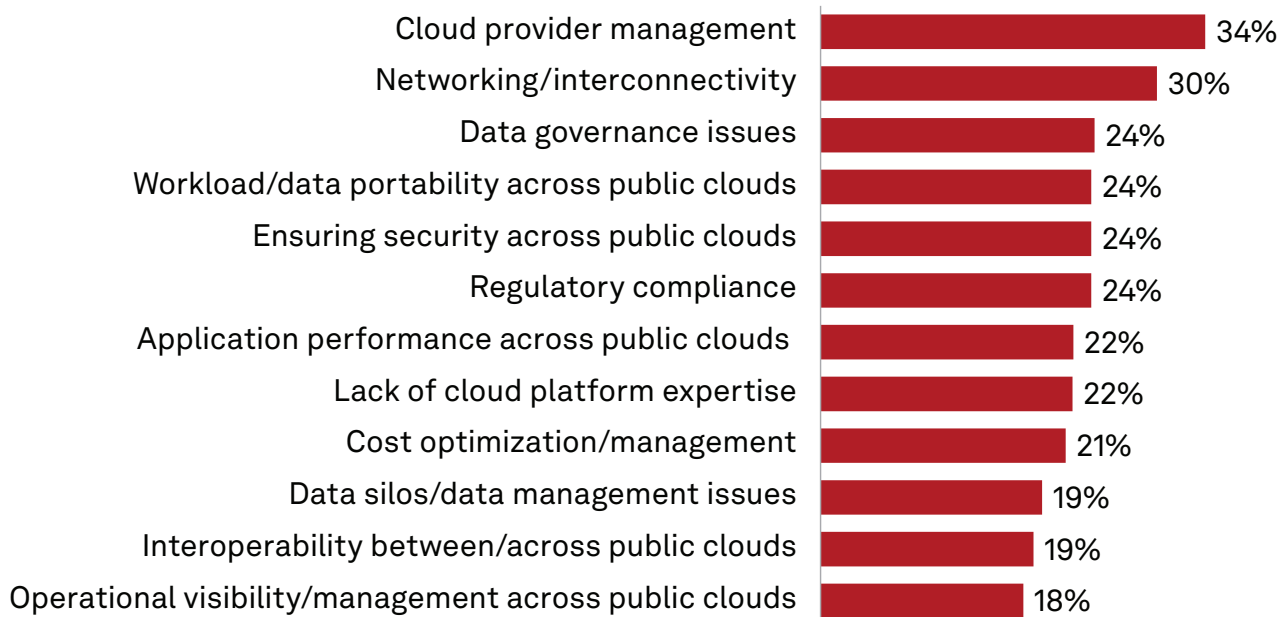


# Multicloud Obstacles: Vision Meets Execution

Multicloud, like any new IT operating model, brings benefits and challenges in its wake. The degree to which benefits outweigh challenges may depend on whether multicloud is part of a broader IT transformation strategy that encompasses the benefits discussed above, or the extent to which it addresses particular cost, organizational or governance concerns.

For many enterprises, simply having multiple public cloud environments to meet the needs of different business and IT personas is good enough for risk mitigation, flexibility of workload venue, cost arbitrage and software licensing issues. This approach aligns with the way the hybrid model (which incorporates on-premises IT into the mix) currently works. Nearly half of organizations report that their on-premises and public cloud environments operate separately, albeit with some workload/data migration between them, and nearly one-quarter operate completely siloed environments.<sup>3</sup> Other enterprises look to multicloud for integrated IT environments in which workloads and the associated data can run across all or most of their public cloud environments, particularly for “split stack” workloads where access to best-of-breed infrastructure, database, AI/ML or application capabilities may be key requirements. In most cases, the prevailing approach to multicloud (simple direct interconnect, along with custom integration) may be sufficient, but this puts the engineering burden primarily on the enterprise (or a third-party systems integrator), resulting in a number of challenges related to skills, tools and best practices. As illustrated in Figure 5, multicloud environments require a range of capabilities and competencies.

**Figure 5: Most significant challenges: What’s holding back multicloud?**



Q. What are the most significant challenges your organization faces or would face using multiple public clouds?

Base: Organizations currently using or planning to use multiple public cloud IaaS/PaaS providers (n=1,461).

Source: 451 Research custom survey commissioned by Oracle, Q3 2022.

3. 451 Research Multicloud study, commissioned by Oracle, 3Q 2022

The ability to manage workloads and data across multiple public cloud provider platforms emerges most often in enterprises' top-three multicloud challenges. This issue essentially comes down to shortage of talent and expertise: In a recent 451 Research survey, more than 80% of organizations highlighted an overall lack of cloud platform expertise and multicloud/hybrid skill sets.<sup>4</sup> However, even if enterprises have unlimited IT personnel and expertise at their disposal, deploying dedicated teams to manage and administer multiple specialized cloud operating stacks may not be the best use of IT resources.

The prevalence of cross-cloud network interconnectivity, workload and data portability, and security issues as top multicloud challenges indicates gaps in the availability and usage of the tools needed to operate easily and efficiently in multicloud IT environments. Enterprises in sectors with highly distributed business operations (e.g., manufacturing, government, healthcare and education) point to networking and interconnecting their multicloud estates as the top challenge — one that also brings security and regulatory compliance considerations.

Application performance (i.e., latency) related to networking and interconnection is also called out as a multicloud obstacle. This is another area where tools and skills are often lacking or fragmented across multiple domains. Organizations in sectors with highly distributed workflows, data stores and business operations, such as software/IT services, transportation, financial services and healthcare, are most affected by application performance challenges. Organizations in the insurance, manufacturing and education sectors (also with distributed business models) point to cross-cloud interoperability as an additional multicloud stumbling block.

Many of enterprises' challenges with multicloud come down to best practices, or the lack thereof. These issues are overlapping and involve data governance, data silos, regulatory compliance and cost management. The relative importance of these challenges varies by sector, but all enterprises will need some degree of organizational adjustment to get everyone on the same page. Successful digital business transformation requires alignment across IT operations, developers and line-of-business stakeholders to build, operate, manage and govern the flexible infrastructure needed to support the distributed workloads and data that create business value. It takes time to fully execute on the multicloud approach, but the resulting freedom of choice and operational agility make the journey worth it.

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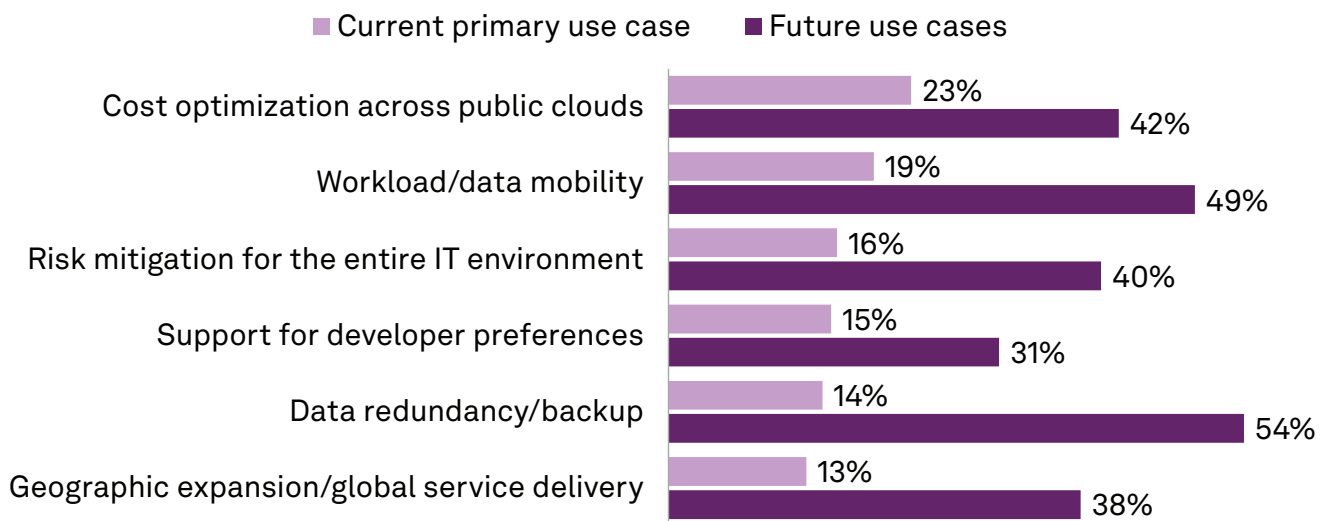
4. 451 Research's Voice of the Enterprise: Cloud, Hosting & Managed Services, Cloud Skills 2022

# Multicloud in the Real World: Is It Living Up to Expectations?

Enterprises’ “best of all worlds” expectations for multicloud boil down to flexibility and agility as they relate to cost, workload placement, application performance requirements and platform preferences.

Organizations using multiple public clouds for infrastructure called out cost optimization and workload and data mobility as the most important current multicloud use cases (see Figure 6).

**Figure 6: Current and anticipated use cases for multicloud**



Q. What is your organization’s most important current use case for multicloud?

Q. What do you see as important future use cases for multicloud at your organization? Select all that apply.

Base: Organizations currently using multiple public cloud IaaS/PaaS providers (n=1,461).

Source: 451 Research custom survey commissioned by Oracle, Q3 2022.

The distribution of current use cases highlights the multifaceted utility of multicloud in enterprise IT strategies, while the future use cases shed light on ways to more fully leverage multicloud architectures. For example, the data redundancy and backup use case could evolve into a broader approach to cross-cloud migration with a view toward split-stack, distributed or parallel workload execution or cross-cloud data storage, processing and analytics. Similarly, workload and data mobility and support for developer preferences could be combined to enable application modernization and “cloud anywhere” functionality. By using container orchestration and other cloud-native technologies, developers and IT can tap into multicloud-based infrastructure to manage, update and deploy workloads in appropriate locations across heterogeneous IT environments.

Ultimately, technical, business and regulatory compliance requirements, which are not always mutually exclusive, drive multicloud use cases.

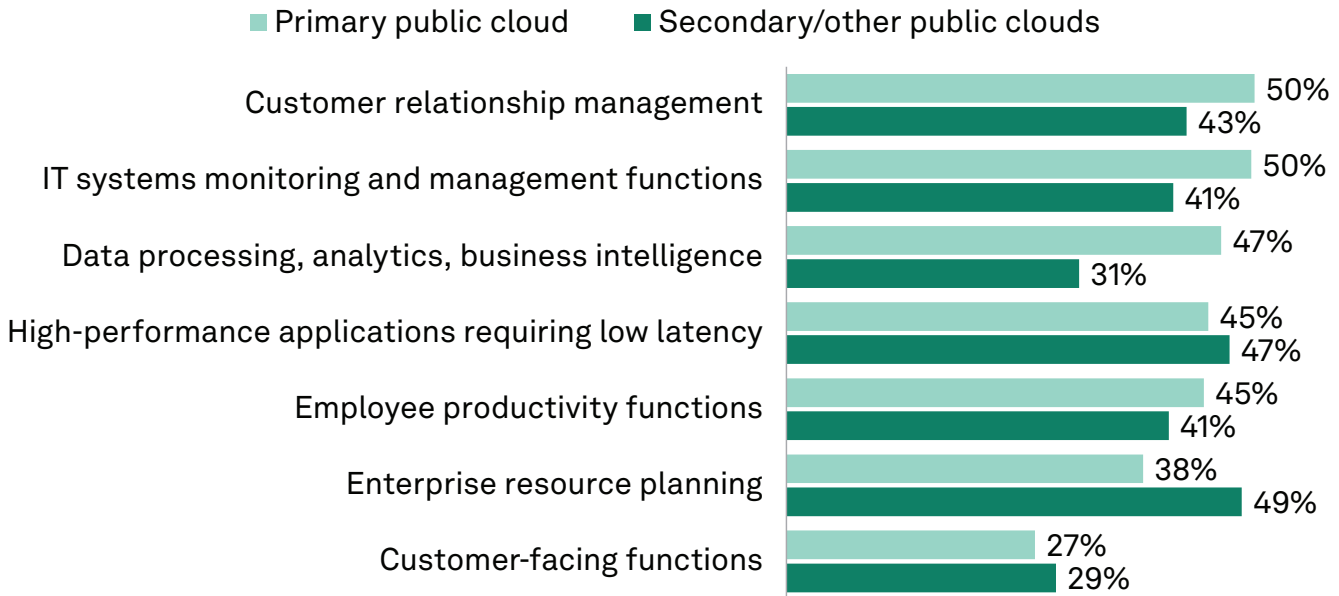
- Technical drivers include application architectures such as tightly coupled or full-stack workloads, as well as loosely coupled cloud-native workloads and mission-critical workloads with disaster recovery and business continuity requirements.
- Business drivers include requirements regarding cost optimization, resiliency, high availability and geographic reach.
- Regulatory drivers include government- and industry-mandated data sovereignty and data privacy regimes.

Most enterprises have a primary cloud provider. In some cases, this is simply a function of where an organization's first public cloud workloads happened to end up. The primary cloud provider can also emerge over time as specific capabilities, such as databases, operating systems and processing speeds, become more important vendor-selection considerations. Enterprises often bring new providers into the public cloud mix as their digital strategies evolve to include analytics-driven innovations designed to address unmet customer needs or to accelerate business workflows. Typically, these data-driven processes involve specialized applications and high-performance capacity requirements that enterprises' initial public cloud providers' platforms may not be optimized to execute.

Digital transformation efforts expand the pool of stakeholders involved in enterprise technology decision-making. Developer and line-of-business personas are increasingly weighing in with their own public cloud platform preferences. These often incorporate different priorities and capability needs than those established by IT operations personas when enterprises made their first forays into public cloud. Corporate dynamics also change over time, and merger and acquisition activity may serve as another catalyst for expanding the universe of public cloud platforms in use.

As illustrated in Figure 7, there is some variation in the extent to which enterprises that host these workloads on public clouds rely on their primary provider instead of, or in addition to, other providers.

**Figure 7: Types of workloads on primary and secondary/other public clouds**



Q. What types of workloads do you currently host with your primary IaaS/PaaS public cloud provider?  
 Q. What types of workloads do you currently host with secondary/other IaaS/PaaS public cloud providers?  
 Base: Organizations currently using multiple public cloud IaaS/PaaS providers (n=1,457).  
 Source: 451 Research custom survey commissioned by Oracle, Q3 2022.

For example, enterprises that view data analytics and intelligence workloads as an especially critical business process tend to have a primary go-to provider for this capability (as indicated by the delta between the types of workloads on primary and secondary providers). However, in this scenario, enterprises may also see value in a tightly coupled cross-cloud architecture where one part of the workflow (i.e., data storage and processing) resides on the primary cloud and others such as analytics and decision support reside on another cloud. Similarly, regulatory mandates or enterprise on-premises software preferences may dictate that data be stored on systems in particular geographies or integrated with certain databases.

In the case of enterprise resource planning (ERP), a complex and mission-critical workload, a majority of organizations look to secondary providers for public cloud hosting. The challenges involved in migrating ERP to the cloud include highly customized business rules, high-performance database and infrastructure requirements, and specialized compliance considerations. In addition, ERP data and analytical outputs are business-critical and often need to be integrated with other enterprise applications. Forty-one percent of large-enterprise respondents (those with 5,000 or more employees) host their ERP systems with their primary providers, but not all primary public cloud platforms are up to the task, given that 49% leverage secondary cloud providers for these workloads. Furthermore, egress charges involved in sharing data across primary and secondary cloud platforms and on-premises may be cost-prohibitive, and software licensing and interoperability issues and latency-related application performance issues may also arise.

The relatively low percentage of customer-facing workloads on primary and secondary clouds reflects several trends. Smaller enterprises (500-999 employees) are more likely to run customer-facing applications on their primary clouds, while larger enterprises are more likely to turn to their secondary clouds. Larger companies may leverage alternative clouds to accommodate data locality issues, geographic expansion initiatives, or redundancy and resiliency considerations. In addition, large enterprises are more likely to have customer-facing operations that now feature complex application dependencies with back-end ERP systems — a situation that may not have existed at the time of primary cloud provider selection.

Organizations' use of primary and secondary cloud providers also varies by sector. Enterprises in industries such as retail, telecommunications, healthcare, insurance, financial services and utilities rely on functions such as e-commerce and customer self-service (e.g., bill pay, reservations, order tracking) to a greater extent than those in other sectors. Therefore, enterprises in these sectors may be more likely to host these workloads in the cloud in the first place. Enterprises in the telecommunications and retail sectors rely most heavily on their secondary cloud providers for customer-facing functions, largely due to country-specific operations for telecom and geographically dispersed operations for retail. However, they may view cloud-based e-commerce and other customer-facing workloads as being mostly software-dependent (often SaaS) and see the infrastructure component (and the vendors hosting or supplying it) as less important.

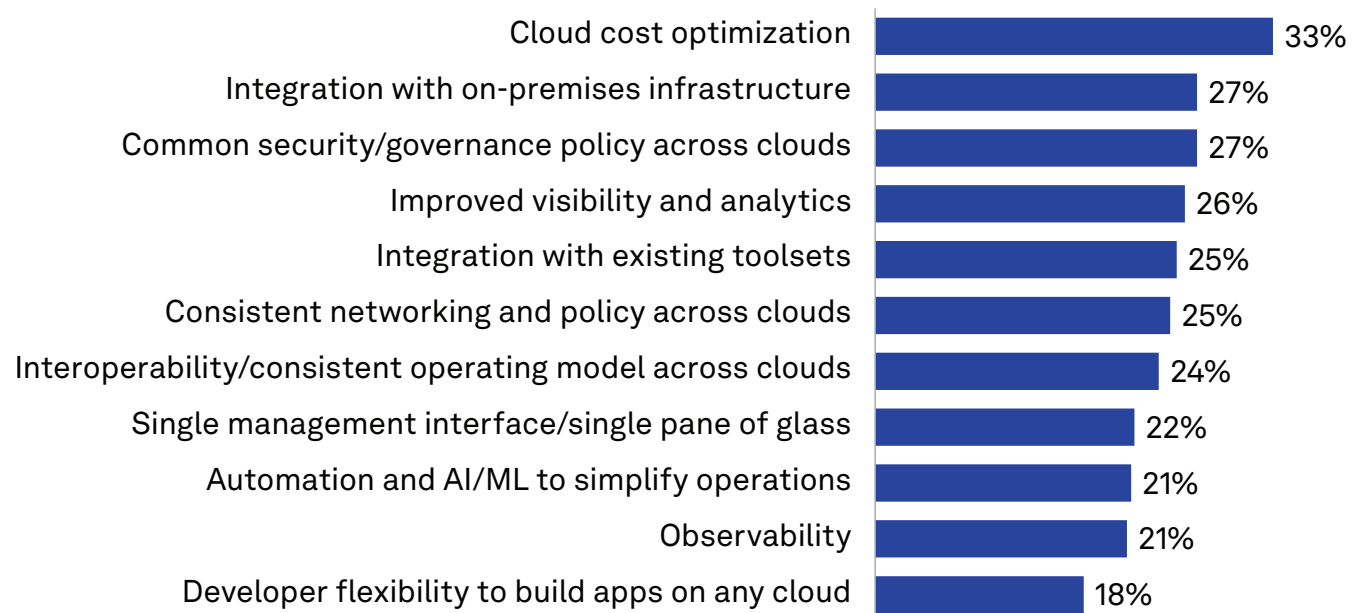
Given the range of use cases and application architectures that enterprises expect multicloud environments to support, are we there yet? Are enterprises' current multicloud environments up to the challenge? What is needed to make multicloud work "as advertised?"

# What Does a Successful Multicloud Environment Look Like?

As noted earlier in the report, a majority of enterprises using public cloud leverage at least two to three cloud platforms for infrastructure and two to four platforms for software and applications. In some ways, multicloud is simply the latest iteration of traditional IT environments where enterprises incorporated best-of-breed infrastructure, software, toolsets and services to deploy, operate and manage their IT estates. In other ways, multicloud (along with the cloud operating model) has upended the foundations of IT by introducing new models and processes for technology procurement, implementation and integration. As with other enterprise IT strategies, multicloud is driven by a range of business, regulatory and workload-specific needs, and enterprises are always on the hunt for better, faster and less expensive ways to get the job done.

Survey data on expected outcomes from multicloud management platforms provides insight into the particulars of what the job might entail. Cloud cost optimization, unsurprisingly, emerges on top, followed by expectations that garden-variety IT service management capabilities will be part of the multicloud management package (see Figure 8).

**Figure 8: Expected outcomes from multicloud management platforms**



Q. What are the key outcomes your organization would expect from a multicloud management platform?

Base: Organizations currently using multiple public cloud IaaS/PaaS providers (n=1,461).

Source: 451 Research custom survey commissioned by Oracle, Q3 2022.

Organizations that want to run interdependent digital business processes and enterprise application workflows across clouds need an array of cross-cloud functionality, including integration with existing infrastructure and toolsets, consistent operating models, common security and governance (including identity access and management), low-latency networking, visibility, application performance management and analytics-driven observability. Over the years, enterprises have relied on a range of (often cobbled together) service management solutions to make IT environments run as more or less unified systems. In the cloud era, automation, APIs and cloud-native engineering built into third-party cloud management platforms may abstract much of the back-end complexity, and centralized resource discovery through a single management interface is a necessary first step toward successful multicloud operations.

Well-architected interconnection is another required component. Forty percent of enterprises using multiple public cloud providers also have solutions in place to connect different public clouds and route data and other information between them.<sup>5</sup> At minimum, interconnection provides network access to cross-cloud data and applications. However, interconnection does not guarantee that the services available on different public clouds will be interoperable or that application performance will be consistent. This level of interoperability will be driven by cooperation, joint engineering and operational agreements between the public cloud providers (both infrastructure and software) and other parties in the still-fragmented cloud ecosystem.

Enterprises should engage with cloud providers dedicated to simplifying and optimizing the multicloud experience. This can happen directly through interoperability partnership agreements or indirectly by making software-based services such as databases, data analytics, artificial intelligence and business productivity applications accessible across public cloud platforms. Collaboration among cloud ecosystem vendors takes some of the multicloud operational burden off the shoulders of enterprises, easing the path to maximum return on multicloud investment. Ideally, the result would be fully managed services with embedded cross-cloud functionality that abstracts the complexity away from enterprise IT to enable seamless, transparent multicloud experiences for end users.

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5. 451 Research Multicloud study, commissioned by Oracle, 3Q 2022



# Methodology

The survey data used in this report was collected by 451 Research, part of S&P Global Market Intelligence, and commissioned by Oracle. The global survey was fielded in the third quarter of 2022 and is based on a cross-industry sample of 1,500 enterprise respondents in North America, Europe, Asia-Pacific, the Middle East and Latin America. For the purposes of this survey, “enterprise” is defined as an organizations with more than 1,000 full-time employees (North America) or more than 500 full-time employees (other geographic regions).

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