

When it comes to the decision to adopt cloud, organizations are increasingly focused on benefits such as performance, security, global reach, and access to adjacent services in the cloud ecosystem.

# Cloud Storage Adoption: From Cost Optimization to Agility and Innovation

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## Introduction

Time to market, speed of innovation, and the ability to quickly monetize products or services, as well as effectively support back-office operations, are key business objectives for any organization. Data remains at the forefront of achieving these objectives and so does the underlying data architecture that makes data available for use. Organizations relying on on-premises compute and storage infrastructure often deal with issues such as inherited storage silos, tightened IT budgets, managing legacy and next-generation workloads, operational overhead, and unpredictable resource requirements.

Adoption of cloud services by enterprise organizations to replace or complement their existing infrastructure has evolved at a rapid pace. Most organizations are actively using cloud in one form or another today, and the COVID-19 pandemic, while a unique occurrence, has highlighted examples of how organizations are adapting to disruption by leveraging the operational agility and economic advantages of cloud. Furthermore, because of this flexibility, in many cases, cloud-related spending and budgets have maintained current levels, or even expanded, despite reductions in overall IT spending.

While most organizations today strategize to deploy cloud, IDC believes that the true potential of cloud with a portfolio of surrounding services must be explored from a cost economics perspective. Organizations must understand the cost economics while keeping in mind the following factors:

- » **Completeness of portfolio.** Organizations must understand the workloads running in their environment now and potentially in the future, as well as the underlying infrastructure needs for compute and storage. This should also include support for structured (block) and unstructured (file and object) data as well as the ability to optimally and cost effectively store data on the appropriate storage tier including intelligent tiering features that automatically reduce long-term costs of data not in active use.

## AT A GLANCE

### KEY STATS

According to IDC research:

- » By 2023, more than 40% of the world's data will be stored in hyperscale/cloud datacenters.
- » Enterprises expect 30–40% data growth annually.
- » Worldwide IT spending will decline by 5.1% in 2020, primarily due to COVID-19. However, spending on cloud services will remain positive during the year as buyers continue to seek out flexible, resilient, and cost-effective infrastructure services.

### KEY TAKEAWAYS

The economic benefits of cloud storage regarding capacity are well understood, but the long-term value and benefits of adjacent services are much harder for enterprises to quantify. These readily accessible services provide customers with the agility to differentiate and capitalize on new features as they mature through their cloud journey.

- » **Data ingestion.** Tools that move data in a timely and high-speed manner are essential for several use cases such as data protection and Internet of Things (IoT). Similarly, tools delivering infrastructure health reports as well as data utilization statistics can help ease management and, in turn, save time.
- » **Ongoing investment in portfolio.** When considering a provider, organizations should evaluate the provider's commitment to innovation, alignment with customer feedback, and existing relationships as the basis for decision making. IDC research indicates that vendor relationship is one of the top 3 categories that drive the choice of provider. Trust is therefore an important factor that also underscores reliable solutions and/or services that enable data storage, data integrity and security, expanding the portfolio, and so forth.
- » **Global reach and locality of services.** For a global organization, it is important that a potential vendor or provider has presence in the regions/countries it operates in and that the regulations of the given countries can be stringently implemented. Highly regulated industries will benefit from localized services that cater to the demands of the particular region or country.
- » **Integrated analytics and artificial intelligence (AI).** This includes additional discrete services and also tools that help manage compliance with personally identifiable information (PII) regulations, data security posture, and automation for overall cost efficiency. Such tools and integrated frameworks are increasingly becoming a must-have for businesses to stay competitive, and their availability is a buying consideration when making cloud-related procurement decisions.
- » **Price predictability.** The ability to measure and manage costs is important as organizations look to move from a capital expense model to an operational expense model with the added pressure of tightened IT budgets. A consumption-based pricing model that aligns cost with activity is a control that allows organizations to focus their budget on prioritized workloads.
- » **Other capabilities.** Adjacent capabilities such as industry-centric services and solutions are appealing for ease of adoption. Similarly, specific industries such as financial services, life sciences, and media and entertainment (M&E) can benefit from certifications and integration with specific industry/workload-centric applications.

## *The Reality of Exponential Data Growth in Modern Enterprises*

IDC's Global DataSphere indicates that the amount of data created over the next three years will be more than the amount of data created over the past 20 years, and the world will create over three times more data over the next five years than it did in the previous five. To be more precise, IDC forecasts the Global DataSphere will grow to 143ZB in 2024 at a 26% CAGR from 2019 to 2024. For perspective, 1ZB of capacity is approximately 50 times larger than all the digital materials held by the U.S. Library of Congress.

It is important to note that not all data translates to storage capacity. Some of this data is transient in nature or discarded within a very short window. It is also critical to highlight the fact that the DataSphere includes consumer data, as well as enterprise data, significantly increasing the total. This is where IDC's Global StorageSphere becomes increasingly relevant by tracking the installed base of storage capacity. The Global StorageSphere installed base of storage capacity is expected to grow at a 2019–2024 CAGR of 17.8%, resulting in an installed base of storage capacity of 13.2ZB in 2024, compared with 5.8ZB in 2019, more than doubling over the forecast period. A growing proportion of this installed base of storage capacity will reside in the cloud. IDC's Global StorageSphere indicates that more than 40% of the world's data will be

stored in hyperscale/cloud datacenters by 2023, up from 10% in 2015. The continued growth of cloud storage over the forecast period indicates sustained adoption — which may be viewed as both an opportunity and a challenge for modern enterprises struggling with data management.

One way to further analyze enterprise data growth is through the lens of industry. Every industry vertical, including media and entertainment, finance, life sciences, and healthcare, is affected by data growth and digital transformation (DX) in some way. As a result, each industry is faced with unique challenges regarding data growth and infrastructure spend. For example, some industries will prioritize data resiliency and protection, others will face unique compliance and government requirements regarding their data, and still others will be pressured to monetize their data in innovative ways. The following industry-specific statistics on data growth further illustrate this point:

- » **Media and entertainment.** IDC's *Worldwide Composite Media Workloads (Compute and Storage) Infrastructure Forecast, 2018–2022* predicts the infrastructure spend for compute and storage will reach \$24.3 billion by 2022, growing at a 14.6% CAGR from 2017 to 2022. This is driven by both the growth of content and the rise of analytics to find trends of content consumption and predict new markets for certain content or content pairings. (Note: Composite workloads in this case refer to a mechanism to size complex workloads that consist of several subtypes. For example, M&E has many subtypes [and infrastructure needs] for the various stages of content acquisition, production, and delivery.)
- » **Life sciences and healthcare.** Genome sequencing and pharmaceutical research are some of the key use cases that drive data growth and data storage. IDC research shows that these are the leading industries that retain data for seven years or more. IDC's interviews with customers in the life sciences space have indicated that the more robust the sequencing model, the larger the data set they would house. Additionally, machine-generated data outpaces the history of human data, and using data (sensors) creates more data (insights, algorithms, management).
- » **Finance.** Interviews with banks show that 50–69% of data is retained forever, and the same amount is also retrieved from long-term storage solutions. However, keeping data forever was a consequence of lack of visibility into what data was kept compared with what was required to be kept for regulatory reasons, with organizations erring on the side of safety by deleting nothing. Strategic plans are being evaluated to reduce the percentage of data retained forever in light of new global and regional data privacy regulations and to develop new value-adding services on the data that's kept to retain and attract customers.

## Why Exponential Data Growth Requires Modern Solutions

Enterprises indicate that they expect an average of 30–40% data growth annually (primarily unstructured). We can also assume that an organization managing 10PB of data today will likely generate and store nearly 14PB of data the following year. This data growth is accelerated only by the need to mine the data for greater insight via AI and analytics. In many cases, this pace of growth may exceed existing capacity plans and quickly pressure the limits of on-premises infrastructure. Unexpected data growth variables (e.g., a global pandemic such as COVID-19 driving a precipitous rise in remote work) only put pressure on organizations to quickly adapt to new realities. In many cases, organizations are slow to adapt to these changes due to infrastructure-related challenges, including:

- » Storage silos caused by deploying disparate solutions across the datacenter and in the cloud
- » Management overhead due to the storage silos, often resulting in greater time spent on infrastructure and management processes

- » Inability to mine data for added value due to lack of tools that can manage and visualize data across storage silos
- » Tightened budget that causes incremental refreshes as opposed to complete modernization effort
- » Inability to scale resources quickly and effectively or take advantage of new technologies due to limitations of current solutions

Many modern organizations are adopting cloud to address these challenges. While conversations may frequently begin with cost as a primary focus, especially when considering which cloud vendor to adopt, buyer perception quickly shifts to depth and breadth of service available with the cloud provider. This is where true value will be tested over the long term.

## ***Global Pandemic Impact on Infrastructure***

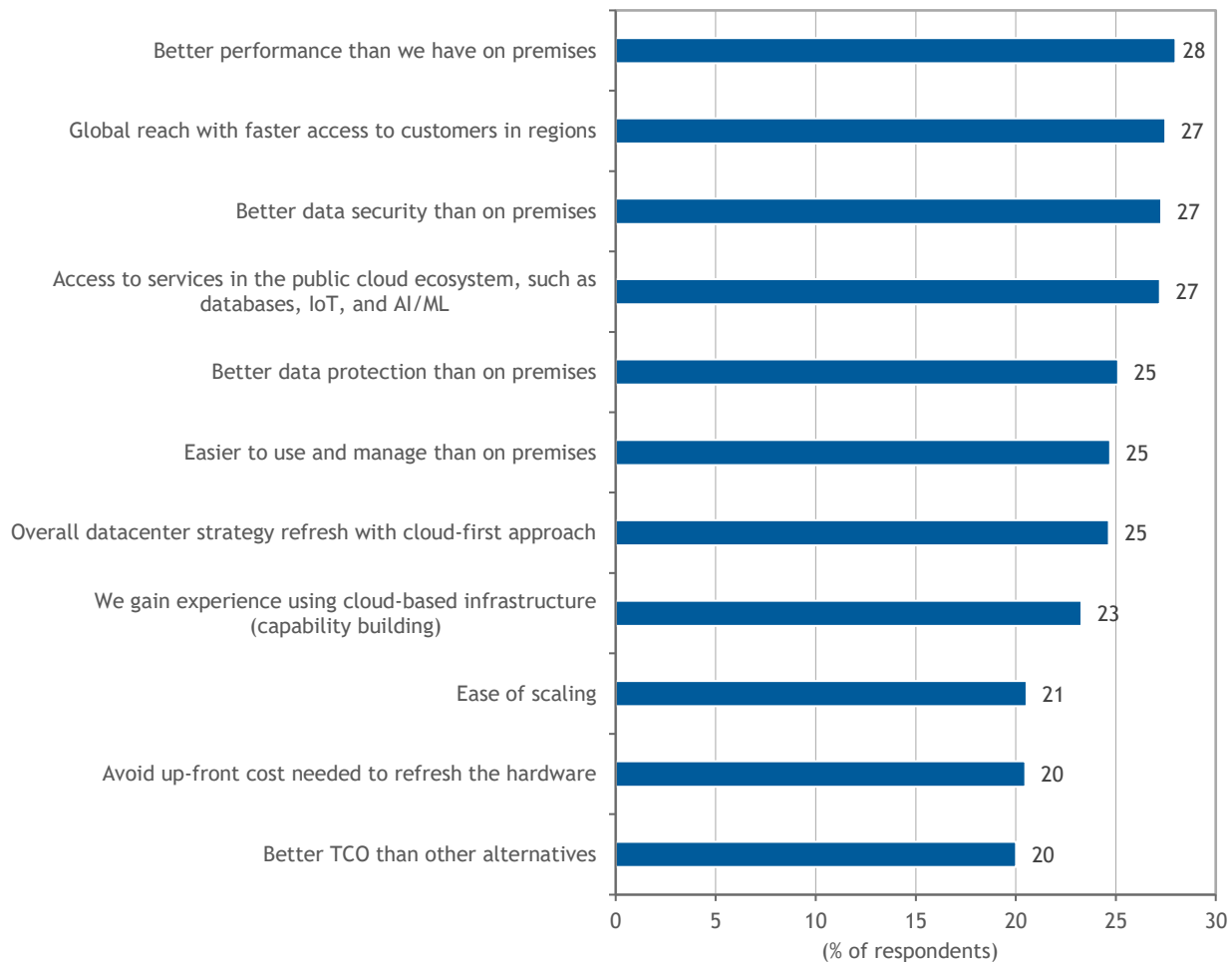
The economic and operational impacts of COVID-19 further illustrate some of the challenges associated with legacy infrastructure outlined in the previous section. IDC estimates that worldwide IT spending will decline by 5.1% in 2020, primarily due to COVID-19. This decline in spending will certainly be disproportionate in some industries. For example, the airline and hospitality industries have been particularly hard hit, whereas many organizations selling consumer goods over the internet for home delivery have been overwhelmed by new demand. The unpredictable nature of the pandemic's impact on enterprises underscores the fact that modern organizations need to be able to adapt quickly and remain agile.

This is easier said than done, but in many cases, one important piece of this puzzle is maintaining a flexible IT infrastructure. Budgetary constraints, coupled with new operational challenges (e.g., accelerated reliance on ecommerce), will only exacerbate challenges currently faced by customers relying on on-premises infrastructure (e.g., data silos, management, capex, and changing demands from net-new greenfield workloads). Changes must be made in budgeting and efficiency when it comes to enterprise IT, and storage will be a key contributor to both the efficiency and cost savings in the immediate future as well as the enabler of new competitiveness going forward. In light of the pandemic, we expect enterprises to continue to allocate more budget to cloud. According to IDC's 2019 *IaaSView Survey*, prior to the pandemic, 78% of respondents reported that their cloud budget had increased in the past two years. We expect this trend to continue.

## ***Analysis of Cloud Adoption Trends***

Digital transformation remains one of the primary drivers for application migration and modernization initiatives, and this trend is not slowing down. IDC's Worldwide Digital Transformation Spending Guide shows that DX-related spending on business practices, products, and organizations will continue at a solid pace despite the challenges presented by the COVID-19 pandemic, growing 10.4% in 2020 to \$1.3 trillion. This is notably slower than the 17.9% growth in 2019, but it remains one of the few bright spots in a year characterized by dramatic reductions in overall technology spending. Modern cloud storage services are a key component of DX initiatives, and in an environment characterized by shrinking budgets, new and existing storage solutions will be graded against this expectation more than ever before.

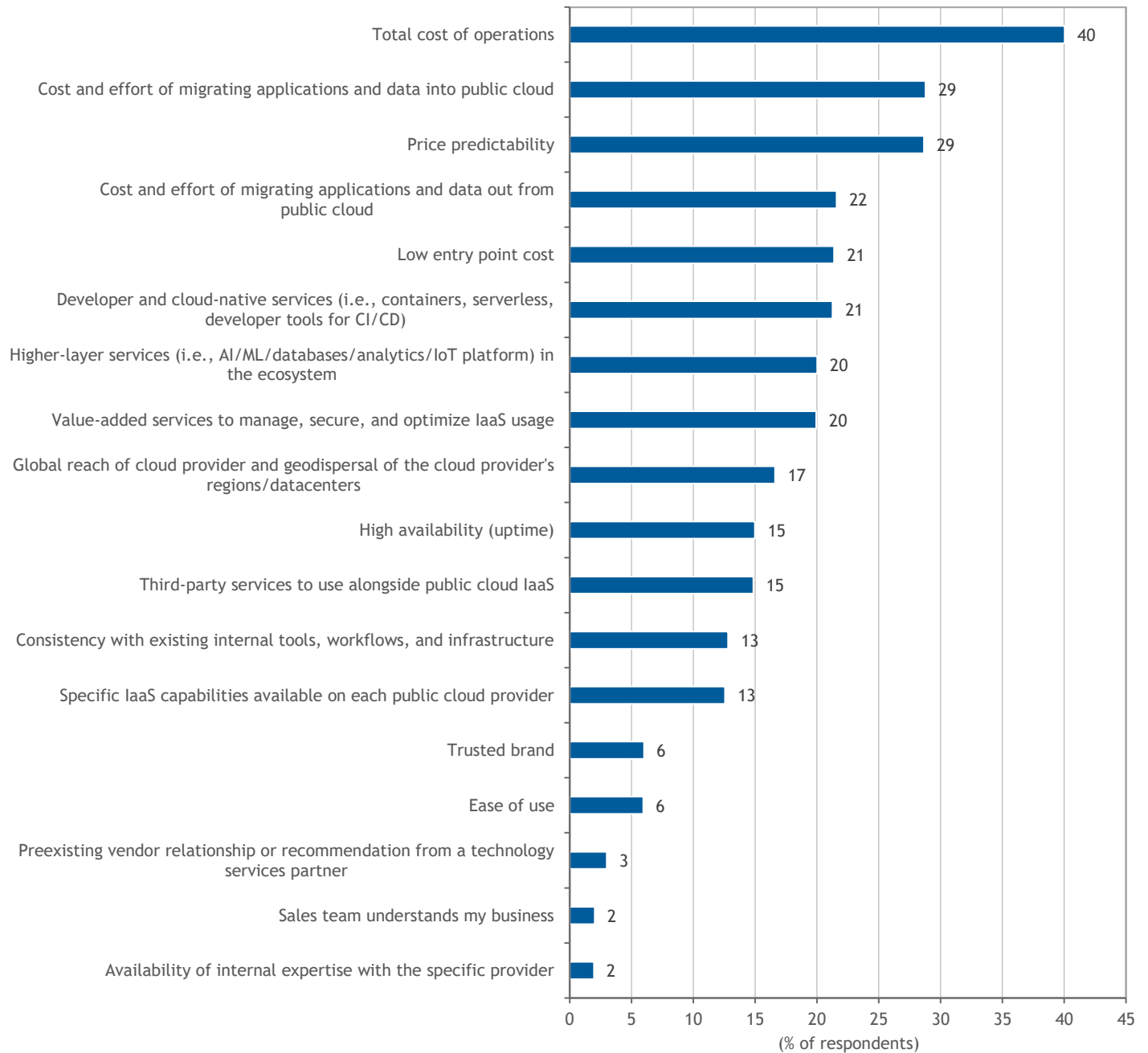
Scaling existing applications and retiring existing/legacy hardware are some of the primary reasons that organizations initially consider cloud services. At the point of initial adoption, customers are typically focused on the performance, security, and global reach of the cloud platform. Access to adjacent services within the cloud ecosystem (e.g., databases, Internet of Things [IoT], analytics) also plays an important role in the decision to use cloud (see Figure 1).

FIGURE 1: *Top Factors Driving the Decision to Use Cloud Instead of Other Alternatives*

Source: IDC's IaaSView Survey, 2019

Interestingly, total cost of ownership (TCO) and up-front cost are some of the least important factors driving the decision to use cloud instead of other alternatives. We believe this further highlights the growing prioritization of other benefits delivered by cloud such as performance, security, global reach and, most importantly, access to adjacent services. We also believe that customer focus on TCO and cost is driven lower by DX-oriented buyers who prioritize workload and application performance, protection, and value generation.

However, cost still plays a major role in considerations when customers select a cloud provider (see Figure 2).

FIGURE 2: *Top Factors Influencing Selection of a Cloud Provider*

Source: IDC's IaaSView Survey, 2019



This data presents an interesting dynamic to consider in the context of cloud adoption: Buyers care about TCO and price predictability when selecting a cloud provider. Buyers will always care about price when it comes to purchase decisions, particularly in today's climate where budgets are under more scrutiny than ever. However, based on these responses, it seems logical to conclude that customer perception of the value of cloud includes both cost-related and business-related variables and goes beyond TCO to include the potential value of a platform's embedded security and data protection features as well as the ability to access adjacent services for emerging use cases such as IoT, AI/machine learning (ML), or databases.

## Cloud Innovation and Benefits

Top cloud providers now offer portfolios that span block, file, and object storage as well as primary high-performant tiers and low-cost cold storage services.

- » Block-based storage services are ideal for structured data sets such as databases that require consistent I/O performance and low latency. Typically, mission-critical applications, which are transactional and compute intensive in nature, such as Oracle and SAP, run on block storage.
- » File-based storage services present unstructured data as a hierarchy of files in folders typically for home directories, file shares, collaborative applications, and so forth. Of all three categories in this section, file-based storage services are the most nascent, yet file-based storage is also an area with active investments from most cloud service providers.
- » Object-based storage services are ideal data lake foundations with scale-out flexibility, frequent access options for current applications, and cost-optimized, long-term retention storage (nearline archival or cold storage) of very large repositories of unstructured data such as images and videos. Metadata that enables big data analytics plays an important role in object storage typically in the form of system and/or custom description of the contents of an object (images, videos, etc.).

The availability of multiple storage services and options enables organizations to select the right storage for their needs and pay for only the functionality and storage performance required. Additionally, organizations can choose from a variety of surrounding services that include but are not limited to the following:

- » **Data analytics.** To increase monetization, organizations should optimize decision making in a time-sensitive manner. This can happen only if existing and ever-growing data sets are continuously mined for insights to find correlations and hidden patterns. The important thing here is to have tools that provide context — information about the data being analyzed and attributes (metadata) of the unstructured data.
- » **Data transfer.** Data is generated from a wide variety of sources (enterprise applications, IoT, end users) and locations (datacenter, edge, and mobile). Cloud providers have made available high-speed lossless data transfer/ingest tools to better utilize this data and retain it in a regulated manner. Database and data warehouse applications require services that span data collection, storage, processing, and visualization. Organizations look for cloud providers with end-to-end services that include support for relational database query and management systems, data analytics services and support for big data platforms, business intelligence software, and data life-cycle management.

- » **Monitoring and management tools.** Reporting and insights on data integrity and security, user access policies, data life-cycle management with automated tiering, application resource usage, and so forth are must-have requirements for most IT organizations. Such services can be embedded or integrated with storage services made available by cloud providers, and organizations will consider the breadth and depth of these capabilities in the cloud service they choose.
- » **Policy-based user access and secure sharing.** This is extremely important, especially with the growth of stringent data retention regulations. Easy-to-implement user access based on identity qualified by users, groups, and roles is a must-have in order to efficiently store data once and enable its use for additional workloads. Also, without identity-based access, a data breach has a higher chance of occurring and resulting in reputation damage and, in turn, revenue loss.
- » **Application migration.** The ability to migrate from on-premises, hosters, or other cloud providers is important functionality that must support migration of workloads such as applications, databases, storage, physical or virtual servers, or entire datacenters. Some of the key areas to be considered are security management, license management, application redesign effort, data and application integration, application development and testing, and ongoing cloud service cost analysis.
- » **AI and ML.** AI/ML is top of mind for organizations of all sizes. Systems built for analytics, machine learning and artificial intelligence, or gene sequencing, for example, support a broad number of tasks including (but not limited to) intelligent/preemptive search, automatic metadata generation, more intelligent document classification, data extraction, and optimization of and decisioning in automated content-intensive processes. Cloud services enable varying degrees of data analytics and artificial intelligence services and software integrations enabling customers easy access to enhanced adjacent services.
- » **Data life cycle and compliance.** Services for long-term retention are necessary for organizations in financial services, healthcare, and government where regulatory requirements can dictate extended data retention, up to multiple decades. These organizations require stringent security controls and need solutions that provide the highest standards of security and compliance support. The ability to quickly move data from archive tiers back to production for new analytics and customer services has become a driver of competitive innovation, agility, and cost savings in the cloud.

The availability of multiple types of storage within a single cloud portfolio allows organizations to easily select the desired combination of storage services based on access protocol and performance requirements, make changes to these services as needed without massive data migration and data transfer overhead, and gain efficiency with simplicity of management. Comparatively, on-premises solutions intended to provide cheaper storage for data that is used less often may require additional layers of operational management and overhead, which risks creating more data silos and more complexity.



## Key Considerations to Evaluate When Migrating to Cloud

Clear direction and leadership buy-in are critical success factors in transitioning to cloud. Otherwise, in many cases, enterprise migration and modernization efforts are selective and ad hoc (rather than comprehensive and holistic). Much of this may come down to the comprehensiveness of an organization's digital transformation initiatives. Or it may simply be a reflection of reality, where purchase and migration decisions are led by individual business units or application owners within an enterprise that may not have the time, budget, skills, or visibility into the organization needed to execute a larger transformation project. Making things more complex, the barriers to cloud adoption change as customers transition from planning stages to active adoption of cloud.

Concern that legacy applications may not work in cloud is one of the top issues among companies still in the planning phase. As companies transition from planning to active use of cloud, regulatory restrictions and internal policy become larger barriers. Other important factors that increase in prevalence among active adopters compared with companies in the planning stage are the challenges presented by complex application interdependencies. These challenges emphasize the need to quickly transition into the cloud adoption phase, even if this means accelerated pilots and small initial scale. This will allow early identification of the obstacles to cloud adoption at scale in the organization — such as application interdependencies that will require engineering effort to resolve.

Cloud providers have an important role to play in helping customers overcome these challenges. Specifically, providers can do so through the range of services and partnerships they provide. Through ISV and managed service partners, cloud providers can help bring industry-, application-, and workload-level expertise to the table during the planning and implementation phases if needed. Furthermore, as customers scale up their cloud usage from initial pilots, access to adjacent services becomes increasingly critical. Our research shows that enterprise customers spend most on additional services for security, support, workload migration, and application refactoring, to name a few. Being able to seamlessly and cost effectively turn these services "on" or "off" throughout the cloud journey is a key enabler of successful, long-term migration.

## Conclusion

Today, the worth of enterprise infrastructure isn't measured by the amount of resources it provides in the form of compute and storage, or incremental cost savings it can deliver; it is measured by the use cases it can enable, the value it can generate, and total cost efficiency in serving the business. In large part, this is achieved by connecting a growing number of services to the data that resides within and is accessible by the organization; services for data resilience, security, artificial intelligence, machine learning, and data management are good examples.

The continued expansion of cloud offers customers access to this growing range of services and, in many cases, allows customers to alter their perception of infrastructure by applying new services and new skills to the equation. As with any technology, there are challenges associated with adoption and expansion, some of which are documented in this analysis. But given the relentless growth of stored data, coupled with the need for organizations to remain agile and innovative to achieve competitive differentiation, we believe cloud will remain a key enabler of any modern enterprise strategy.

The continued expansion of cloud offers customers access to a growing range of services and, in many cases, allows customers to alter their perception of infrastructure by applying new services and new skills to the equation.

Further, the impact of COVID-19 on enterprises and the global economy is a stark reminder that organizations need to remain agile and flexible to adapt to unknown and unforeseen events. The pandemic has shown how enterprises can successfully leverage cloud storage and application services to quickly and cost effectively keep their business moving — whether that means scaling resources to accommodate growing online transactions or refactoring applications for remote employee access.

## About the Analysts



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Andrew Smith is a Research Manager within IDC's Enterprise Infrastructure Practice. Andrew's research focuses on public cloud infrastructure-as-a-service platforms and solutions, with specific focus on storage services. Andrew contributes to market sizing and forecast efforts across IDC's Public Cloud IaaS segments, as well as adjacent markets like multicloud data management, data protection as a service, and public cloud cold storage.

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