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# Successful Enterprise Application Modernization Requires Hybrid Cloud Infrastructure



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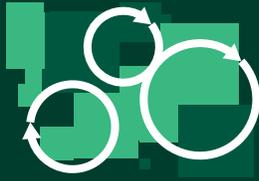
**Contributing Research:**

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Operations research group

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# Executive Summary

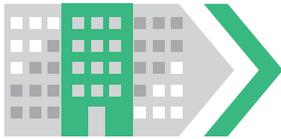
Applications are the center of almost every modern business function and customer interaction, and the need for those applications to be flexible, reliable, and secure is steadily increasing. The best way to sustain these attributes is to ensure that the infrastructure supporting those applications (e.g., servers, mainframes, storage, or cloud) is modernized as well. As organizations look to make improvements to their applications, careful consideration should be put into what underlying infrastructure applications will be running in order to optimize desired outcomes. Companies that fail to adapt to these changes through infrastructure transformation and application modernization initiatives risk falling behind competitors and becoming irrelevant in the minds of consumers.

In March 2021, IBM commissioned Forrester Consulting to evaluate how organizations are approaching application modernization efforts to understand the importance of hybrid cloud computing and storage infrastructure (inclusive of one or more clouds and on-premises systems functioning as private clouds or traditional data centers) for supporting digital transformation objectives. Forrester conducted an online survey of 412 IT decision-makers and three in-depth phone interviews with senior IT leaders to explore this topic. The study found that companies are at varying stages with modernization efforts, but those that are better prepared with the right technology, skills, and processes to work in hybrid cloud environments tend to be further along in their modernization journeys.

## KEY FINDINGS

- › Modernizing existing applications and infrastructure is a top digital transformation goal for over 40% of IT decision-makers.
- › Cloud adoption is increasing, but enterprise-class servers and storage are still highly relevant. Eighty-two percent of IT leaders (from companies currently using enterprise-class servers and storage) believe that enterprise systems will play an increasingly important role in the future of their business in supporting key business workloads.
- › The ability to manage applications across a hybrid cloud infrastructure is critical for application modernization. Poor alignment of people, processes, and technology is one of the biggest challenges that organizations face when modernizing applications with hybrid clouds. Standards (especially those based on open-source projects) can help teams maximize their modernization efforts on-premises and in the public cloud.
- › Skill gaps create modernization risk. While firms are increasingly confident in their ability to operate cloud-native applications, they are less confident in the level of development, testing, and DevOps skills available for application modernization. As a result, many are cautious and are looking to keep efforts close to home with a hybrid cloud approach.

# Digital Transformation Requires Modernization Of Both Applications And Infrastructure



Modernizing existing applications and infrastructure is a key transformation objective.

Nearly every company today is thinking about digital transformation at some level. From a strategic perspective, the need for transformation is most commonly driven by a desire to improve customer experience, business agility, and security, and to enable employees to be more productive. On the tactical side, companies recognize that delivering on strategic transformation objectives requires modernizing existing applications and infrastructures to ensure employees have the right tools and technology to succeed in their roles (see Figure 1). In this study, application modernization is defined as the people, process, and technology improvements (including both on-premises and cloud infrastructure) that companies are making to better support business outcomes.

**Figure 1**  
**Modernization is critical for driving desired digital transformation outcomes**

“What are your company’s top digital transformation goals/objectives?”

### Strategic goals

-  53% Improve CX
-  45% Improve business agility
-  45% Improve innovation

### Tactical objectives

-  46% Improve security of apps and infrastructure
-  43% Modernize existing apps and infrastructure
-  39% Enable employees to be more productive

Base: 412 global decision-makers responsible for enterprise server and application development or deployment decisions  
 Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, March 2021



Modernizing existing applications and infrastructure is a key transformation objective, but the different types of applications and infrastructures make this seemingly simple objective quite complex. First is knowing what applications to modernize. Businesses require a lot of different applications to function, but 66% of decision-makers ranked customer-facing applications as one of their organization's top three priorities, with 63% for core business systems and 57% for data management applications. Every company has a slightly different focus for what it wants its modernization efforts to achieve. Forrester's interviews with IT leaders from three different industries provided additional perspective about what application modernization efforts may include. The following examples demonstrate how organizations in different industries have different priorities when it comes to modernization:

- › **State government example:** For a Department of Child Services within a state government, the modernization use case that was of top priority was its CRM/case management applications, followed by modernizing enterprise resource planning (ERP) to handle core financials. Improving these core systems was critical because the case management systems handled the bulk of the traffic. The CIO we spoke to mentioned that as the organization's use cases for analytics/AI continue to rise, proper data management will be critical because there needs to be more self-awareness of existing data to effectively use it.
- › **Banking industry example:** The bank technology leader we spoke to said his organization's top priority for application modernization was customer systems, specifically with the aims of improving customer experience and driving better customer insights. The COVID-19 pandemic increased the importance of this priority because many banking interactions that were previously conducted in person needed to be converted into digital formats. The interviewee said: "It has taken some kind of prioritization because now we are understanding that technology can play a huge part [in the customer experience]." The interviewee said modernizing core systems is also important, but those improvements are geared toward making the systems easier to manage.
- › **Insurance industry example:** When we asked an insurance technology leader about his organization's top priority for application modernization, customer-facing systems were the clear winner. He said: "There's an easy number one there – nothing even comes close – that's the customer-facing applications. You have to have the legendary customer experience. If you don't have it, you're not in business." He said the second modernization priority for his organization was data and analytics, specifically analytic solutions based on customer actions and data.

Application modernization use cases vary substantially by industry, and each of the respondents' and interviewees' companies are at different stages of their application modernization initiatives. With that in mind, it is difficult to prescribe an exact path for improving an application modernization strategy that applies to everyone. However, this study highlights a few general steps and initiatives that companies can take to drive more successful application modernization efforts.

“There’s an easy number one there – nothing even comes close – that’s the customer-facing applications. You have to have the legendary customer experience. If you don’t have it, you’re not in business.”

# Application Modernization Is Supported By Cloud And Enterprise Computing And Storage Systems

Application modernization is challenging for many companies, as roughly 40% of respondents said their organizations face budget constraints and concerns about business disruption, data security, and culture change. Knowing how to modernize can be difficult because cloud and on-premises infrastructures each carry specific challenges that organizations must consider (see Figure 2). For example, concerns about running applications on-premises include high costs, limited ability to scale, and a need for ongoing skills/support. Conversely, common challenges with running applications on the cloud include data security, lack of control, and application security. Each deployment option is essentially the solution to the key challenges of the other method, further strengthening the importance of hybrid cloud.

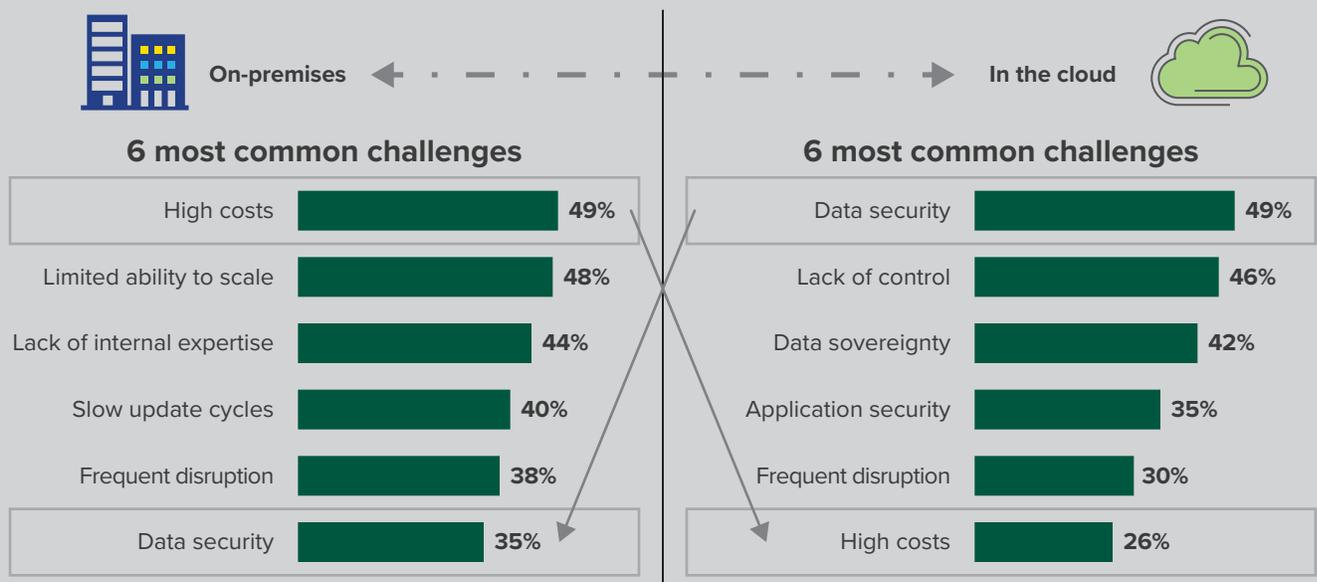
Due to these different challenges, most companies are not immediately diving headfirst into the cloud when it comes to modernizing large, mission-critical workloads. Instead, 58% are taking a more gradual approach by aiming to modernize in place and then deciding what to move to the public cloud when appropriate. Eighty-two percent of IT leaders from organizations that already use enterprise-class servers and storage said they believe those systems will play an increasingly important role in the future of their business in supporting key business workloads.

58% of organizations are taking a gradual approach by aiming to modernize in place and then deciding what to move to the public cloud when appropriate.

82% of respondents believe that enterprise-class servers will play an increasingly important role in the future of their business in supporting key business workloads.

Figure 2

“What challenges do you face, or concerns do you have, with running your business applications?”



Base: 412 global decision-makers responsible for enterprise server and application development or deployment decisions  
 Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, March 2021

Using a hybrid cloud approach to application modernization (i.e., inclusive of one or more public clouds and on-premises systems functioning as private clouds or traditional data centers) enables businesses to modernize applications in small increments while still leveraging current investments to build a best-fit infrastructure for the workload. Hybrid cloud allows IT leaders to put each workload on the right combination of infrastructure rather than taking a one-size-fits-all approach.

A hybrid approach also helps address the skills mismatch brewing with respect to application modernization. While most respondents (61%) said their organization has the talent and skills needed to operate cloud-native applications, a minority (43%) said their organization has the testing and DevOps skills required to modernize applications. And even fewer respondents (30%) said their organization has the development talent and skills needed to modernize applications.

The bottom line is that while nearly 6 out of 10 respondents said their organization is committed to modernizing in place, embracing cloud-native concepts means embracing hybrid clouds. Hybrid clouds help organizations address the skills and integration challenges of adopting cloud-native technologies for their most important workloads by providing standards and consistent technologies based on open-source standards. The result gives decision-makers greater control, and it affords their organizations more time to build the development, testing, and DevOps skills needed to modernize their core applications. One respondent said the biggest advantage of hybrid cloud is that it “gives our businesses the greatest control over critical and important data, and it also leads to improved security for the organization.”

**APPLICATION MODERNIZATION APPROACHES VARY BY WORKLOAD**

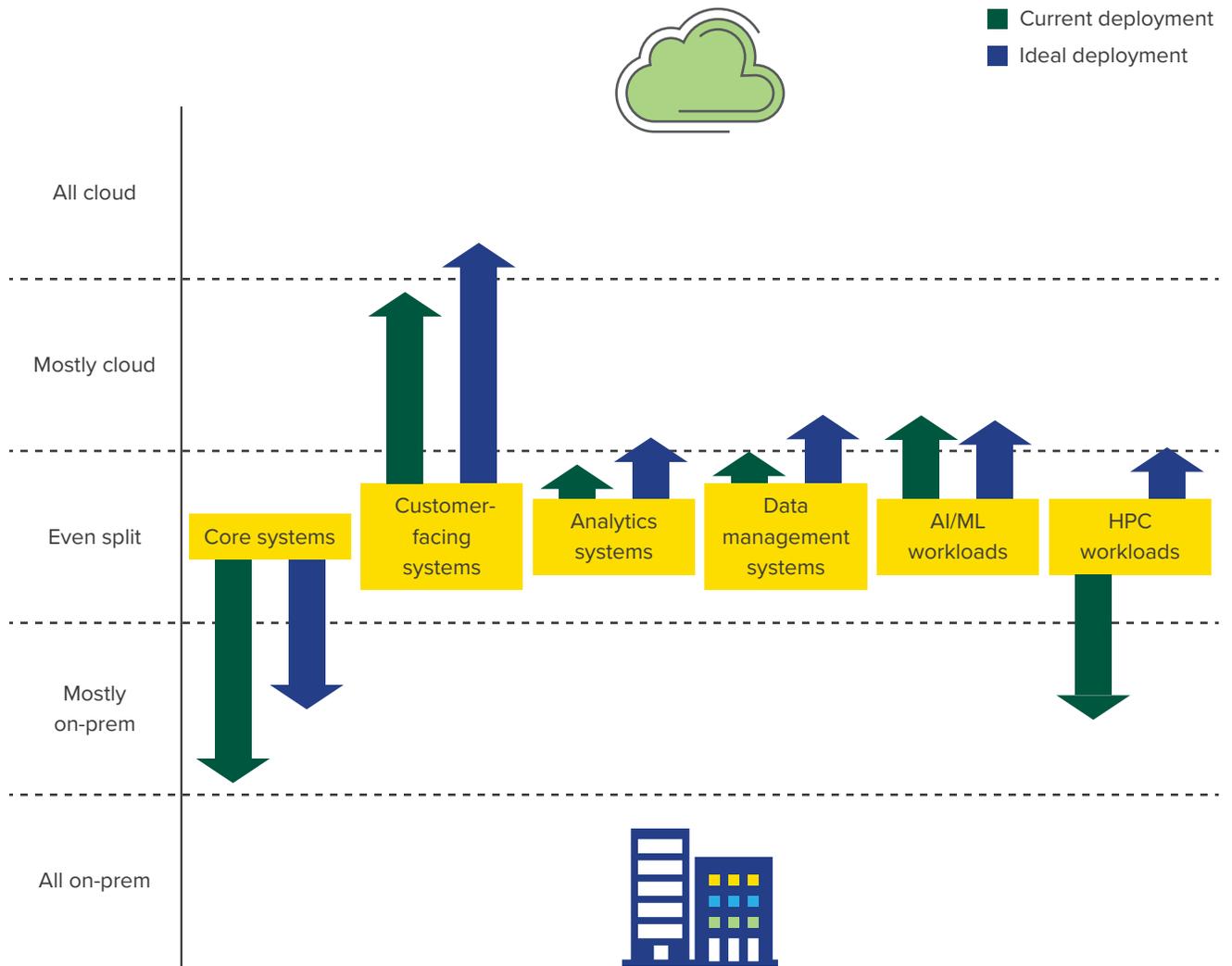
One IT leader we spoke with stated, “There is no ideal world for [application deployment].” This speaks to how business leaders are generally more comfortable keeping certain core business systems on-premises while they prefer the cloud for other systems such as customer-facing systems (see Figure 3). It also drives home the need for robust integration across hybrid infrastructures and consistent standards for tools, architectures, and deployment artifacts as application workloads are not silos unto themselves. Customer-facing applications require data from core business systems to operate, and analytical application workloads to feed data back into the core. Therefore, hybrid cloud becomes critical for modernizing applications. It enables organizations to maintain stronger connections between core, analytics, high-performance, and customer-facing workloads.

Hybrid cloud allows IT leaders to put each workload on the right combination of infrastructure rather than taking a one-size-fits-all approach.



Figure 3

71% of surveyed IT leaders value having a consistent way to deploy cloud-native applications across on-premises infrastructure and public clouds



Base: 412 global decision-makers responsible for enterprise server and application development or deployment decisions  
Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, March 2021

# A Hybrid Cloud Approach Provides The Tools, Flexibility, and Scalability That Organizations Need

Organizations need their primary workloads to be secure, scalable, and resilient. But that can be challenging when integrating existing enterprise workloads with cloud-native applications deployed using containers, microservices, and modern DevOps practices. As a result, enterprise decision-makers said they place high value on the following capabilities:

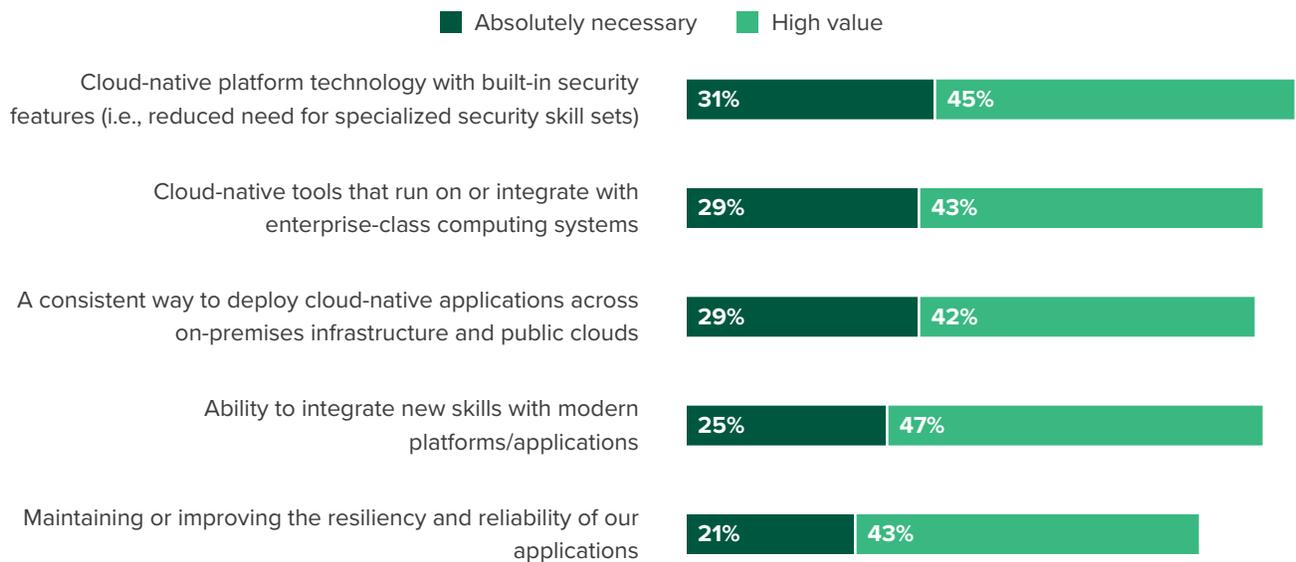
- › **Integration and security that binds old and new.** Surveyed leaders said their most-valued functions for supporting application modernization efforts include using cloud-native tools that run on or are integrated with enterprise-class computing systems, having cloud-native platforms with built-in security features, and maintaining or improving the resiliency and reliability of applications (see Figure 4).
- › **Scalability.** Hybrid cloud offers a way to make on-premises or virtual infrastructures friendlier with cloudlike pricing and scalability. Thirty-eight percent of surveyed leaders said they expect flexibility with consumption-based pricing models for compute, storage, or networking (i.e., the ability to scale on demand while only paying for the capacity consumed) will be a primary outcome of modernizing with hybrid cloud.
- › **Tools that build on what employees already know.** More than one in four surveyed decision-makers (26%) expressed concern about a lack of skills when their organization runs its business applications in the cloud. Another challenge they called out was a lack of internal expertise to provide ongoing support for business applications if they are moved to the cloud. Given these concerns, it makes sense that organizations would keep important core systems closer to home by using a hybrid cloud approach.
- › **Open and standard deployment across hybrid cloud infrastructures.** More than seven in 10 respondents said their organization needs a consistent way to deploy cloud-native applications across on-premises and public-cloud technologies. This desire for consistency and standardization is realized by open-source technology like Open Container Initiative (OCI) containers and container orchestrators.

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Optimizing the use of hybrid cloud to support applications can be challenging. When looking at the actual implementation of cloud-native tools/resources, there are promising adoption rates for event-driven architecture (43%), containers (40%), functions (36%), and container-native storage (32%). But the proportion of managed DevOps service adoption is even higher (48%). When asked what resources are most important for optimizing the use of hybrid cloud, surveyed decision-makers said they are focused on managed services and automation. This doesn't mean that microservices and containers are unimportant; it just reveals that there's a growing appetite for organizations to be cloud consumers rather than cloud developers.

**Figure 4**

**“How valuable to you are the following capabilities related to your application modernization efforts?”**



Base: 412 global decision-makers responsible for enterprise server and application development or deployment decisions  
 Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, March 2021



# Proper Readiness For Application Modernization Drives Better Results

Application modernization requires deliberate planning and consideration regarding the infrastructure technology that will be used, the skills and resources that will be needed to support those infrastructure types, and the internal processes that will enable employees to be successful in working with modernized systems. One CIO of a state government department said the biggest challenge people have with modernization is “zero alignment across people, process, and technology.” In our survey, we assessed all participants across these three dimensions of people, processes, and technology and classified them into three groups based on their responses: unprepared, starting, or prepared (see Figure 5).<sup>1</sup>

Companies that have a high level of readiness for enterprise modernization exhibit it across these three dimensions:

- › **People readiness.** Companies that excel in this dimension have the right skills to develop, operate, and secure cloud-native applications and to execute at scale using self-organizing and highly autonomous (i.e., agile) teams.
- › **Process readiness.** Companies that excel in this dimension have the right policies and levels of automation to support rapid delivery of new capabilities. They have modern DevOps processes and continuous integration and measurement.
- › **Technology readiness.** Companies that excel in this dimension have the right platforms and service companies put in place to support cloud-native concepts (e.g., microservices, containers, APIs, events, self-provisioned resources, DevOps automation).

Comparing the groups shows that companies with higher modernization readiness are much further along with modernization efforts. Forty-five percent of surveyed decision-makers from companies in the prepared group said their organization is already modernized and working on refinements. Of those from less prepared companies, 65% said their organization is still in the planning or beginning phases. Companies with higher readiness are also able to minimize the challenges that companies commonly face with modernization due to their alignment with tech, people, and process priorities. This allows them to achieve outcomes more quickly (see Figure 5).

The biggest challenge people have with modernization is “zero alignment across people, process, and technology.”

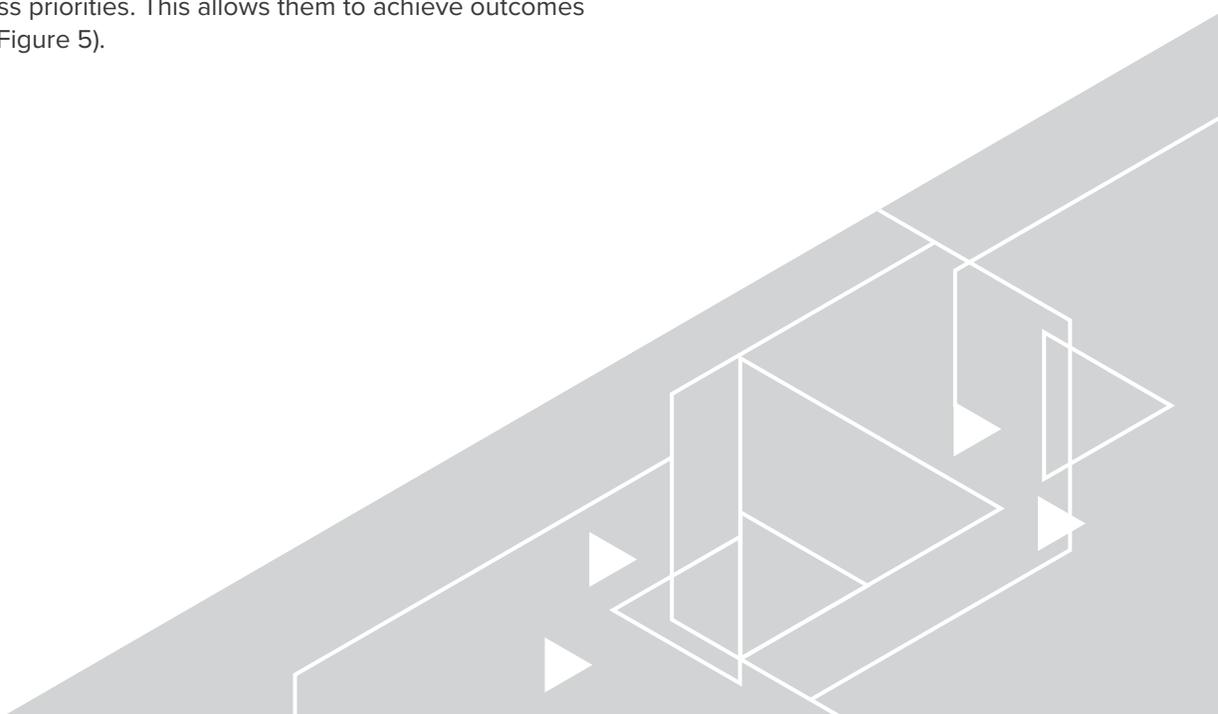
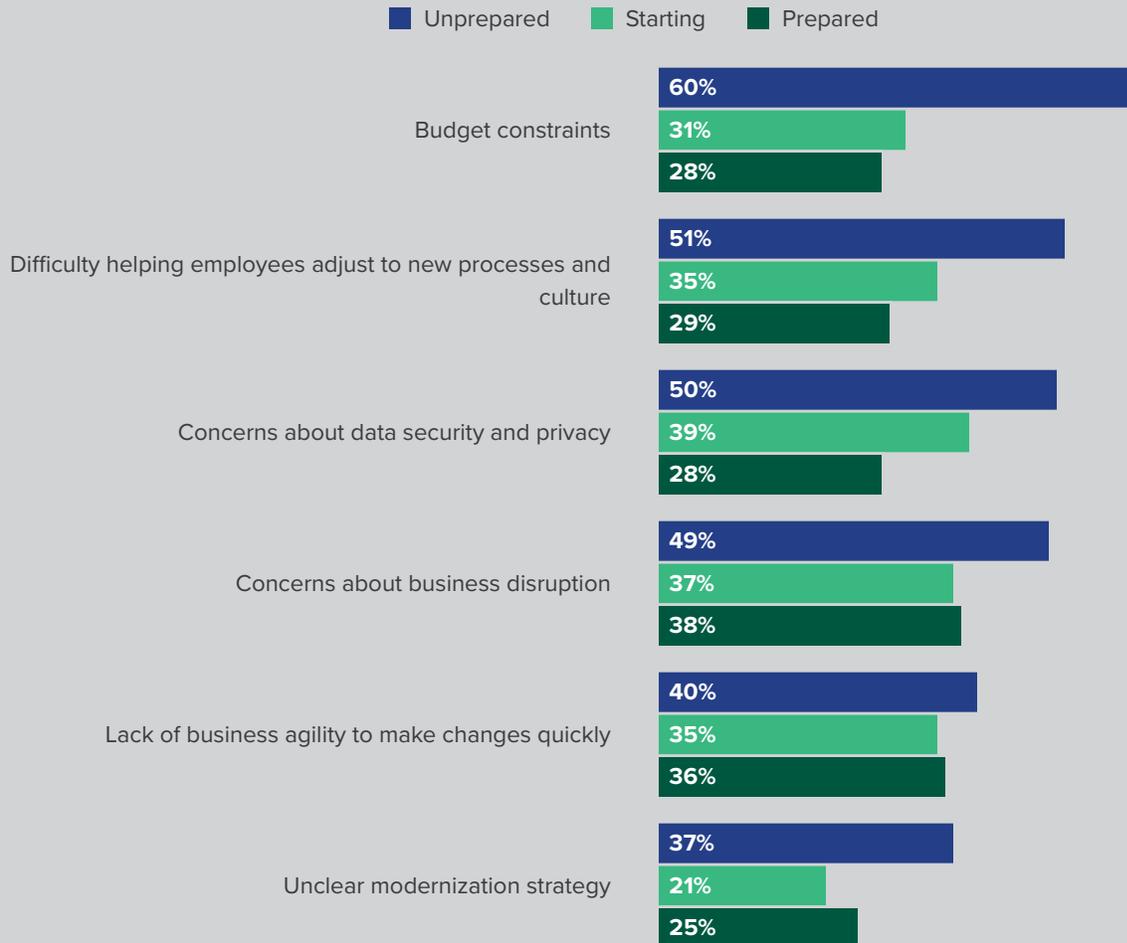


Figure 5

Unprepared (33% of respondents)	Starting (40% of respondents)	Prepared (27% of respondents)
<b>Attributes</b>		
Companies that lack the proper technology, developer skills (cloud and on-prem), security policies, and business processes for effective application modernization  <b>65%</b> are planning or just beginning modernization efforts.	Companies that have solid modernization approaches but struggle with getting the right developer skills (cloud and on-prem), security policies, and business process improvements for more complete application modernization  <b>58%</b> have completed several modernization efforts with more underway or planned.	Companies that have the right combination of technology and development skills (both cloud and on-prem), coupled with strong security policies and workflows to enable faster application modernization  <b>45%</b> have already modernized primary applications and are now in a process of continuous improvement.
<b>Challenges</b>		



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## BENEFITS OF MODERNIZATION

Underpinned by successful computing and storage modernization via hybrid cloud, application modernization is essential to business success. Leaders from companies engaged with application modernization efforts expect the following outcomes (see Figure 6):

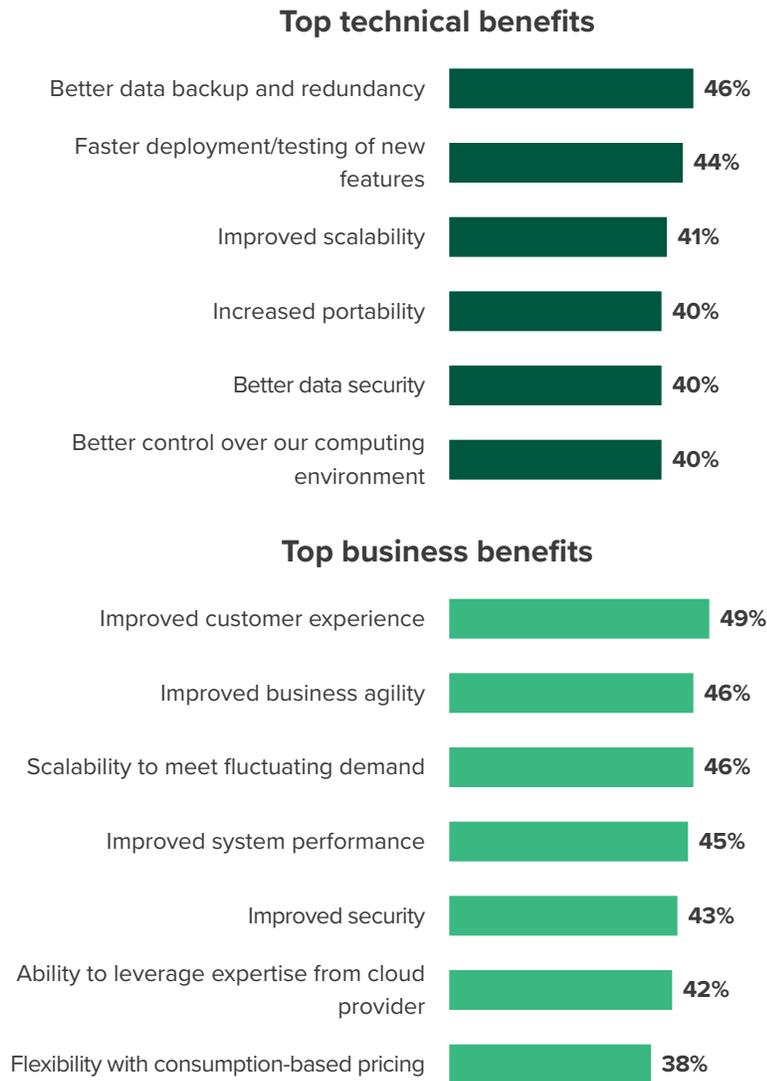
- › **Enhanced security.** Modernizing application workloads with hybrid cloud allows organizations to control where and how certain processes occur and where certain types of data are stored. This control allows for sensitive workloads to be maintained in on-premises or private-cloud environments, which helps business leaders comply with security and regulatory requirements.
- › **Increased business agility.** Having the ability to quickly test and deploy new features is an important part of modernization (and ongoing improvements). This is a key technical benefit that 44% of surveyed leaders said their companies expect to have as they modernize their applications. Hybrid cloud provides greater flexibility to enable new changes than if they were tied to only one system.
- › **Improved scalability.** Gauging demand for certain workloads can be nearly impossible, and hybrid cloud provides organizations with that needed buffer to scale up or down. That is why nearly 50% of surveyed leaders said they consider scalability to meet fluctuating demand to be a primary benefit of modernization with hybrid cloud. Not every workload has volatile demand, so a hybrid approach allows organizations to strategically implement certain workloads (such as customer-facing applications or analytics applications) on highly elastic infrastructures to meet demand.
- › **Better data management (including backup, redundancy, and security).** Cloud provides an easy backup for on-premises service and data centers. Forty-six percent of surveyed leaders said having better data backup and redundancy is a key technical benefit. In fact, it is the most common technical benefit that respondents identified. This redundancy helps provide peace of mind to IT staff who can rest easy knowing their data is protected.
- › **Improved customer experience.** The combination of the benefits of improved security, agility, scalability, and data management ultimately help organizations to provide better experiences to their customers. Fifty-three percent of respondents said this is a top digital transformation goal for their organization. Having more scalable front-end systems enables better system performance to avoid service interruptions, having better agility to implement changes provides a competitive advantage by allowing organizations to quickly respond to evolving customer needs, and having improved security assures customers that their information is protected.

Nearly half of surveyed decision-makers said they consider scalability to meet fluctuating demand to be a primary benefit of modernization with hybrid cloud.

“It’s always beneficial to work with hybrid cloud because we can modify it in regard to our specific needs and adjust them accordingly.”

Figure 6

Benefits of application modernization with hybrid cloud compute and storage



“Using hybrid cloud gives our businesses great control over the critical and important data, and [it] also leads to improved security for the organization.”

“The single greatest advantage [of] using hybrid infrastructure is that it is able to support a migration from a public [cloud] to a private cloud and vice versa.”

“It’s always beneficial to work with hybrid cloud, as we can modify it in regard to our specific needs and adjust [it] accordingly.”

Base: 412 global decision-makers responsible for enterprise server and application development or deployment decisions  
Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, March 2021

# Key Recommendations

Whether they are customer-facing or internal, business applications are essential for running any business. As business leaders embrace digital transformation and attempt to better prepare for the future, the question is not “Should we modernize?” Instead, it should be “How and what do we want to modernize and are we prepared?” Knowing the answers will be essential to a successful transformation. To help better prepare your organization for its modernization journey or to help support current efforts, Forrester recommends the following:



## **Your organization’s application modernization strategy should incorporate a hybrid approach.**

The data could not be more clear: Enterprise workloads are not created equal and neither are organizations’ ability to become cloud-native. Using the public cloud to get cloud to customers makes a lot of sense, as does keeping core systems secure and safe while optimizing the resources to run them. Having a hybrid cloud strategy that delivers flexibility across public clouds and on-premises infrastructure maximizes flexibility and security while reducing the risk of enterprise transformation. It also helps firms maximize the skilled resources they do have while easing integration with existing core systems.



## **Use a hybrid cloud platform that leverages open standards and frameworks.**

While flexibility and portability are good traits for cloud-native technology, development silos and framework sprawl are not. Look for consistent deployment artifacts like containers that offer portability of deployment and standardization of deployment artifacts and DevOps processes. Open standards and open-source frameworks help drive consistency and portability, so embrace them whenever possible. The goal is to have development tools and packaged software components that are consistent even when deployed across multiple public clouds and on-premises infrastructures.



## **Assess your organization’s readiness to modernize its applications.**

There are no modernization silver bullets. Modernizing is hard work that requires a combination of the right skills, disciplined and repeatable DevOps processes, and adaptable technology. The first step is conducting a robust application assessment. If your organization’s readiness is not where you want it to be, then consider augmenting skills and/or starting with smaller and simpler workloads to get early successes under your belt. Partners can help while your organization increases its readiness.



## **Build your organization’s business case on more than technology benefits.**

It’s easy for technologists to get lost in the technology benefits of cloud-native technologies. But unless the technologies drive real business value, organizations risk adding complexity for minimal top-line growth. Modernizing customer-facing systems to improve Net Promoter Scores is one example.<sup>2</sup> Adopting agile development practices to build new features that drive revenue by increasing velocity is another. Reducing compliance costs is a third. Including business benefits in your business case will help teams better address which workloads to prioritize with their modernization efforts.

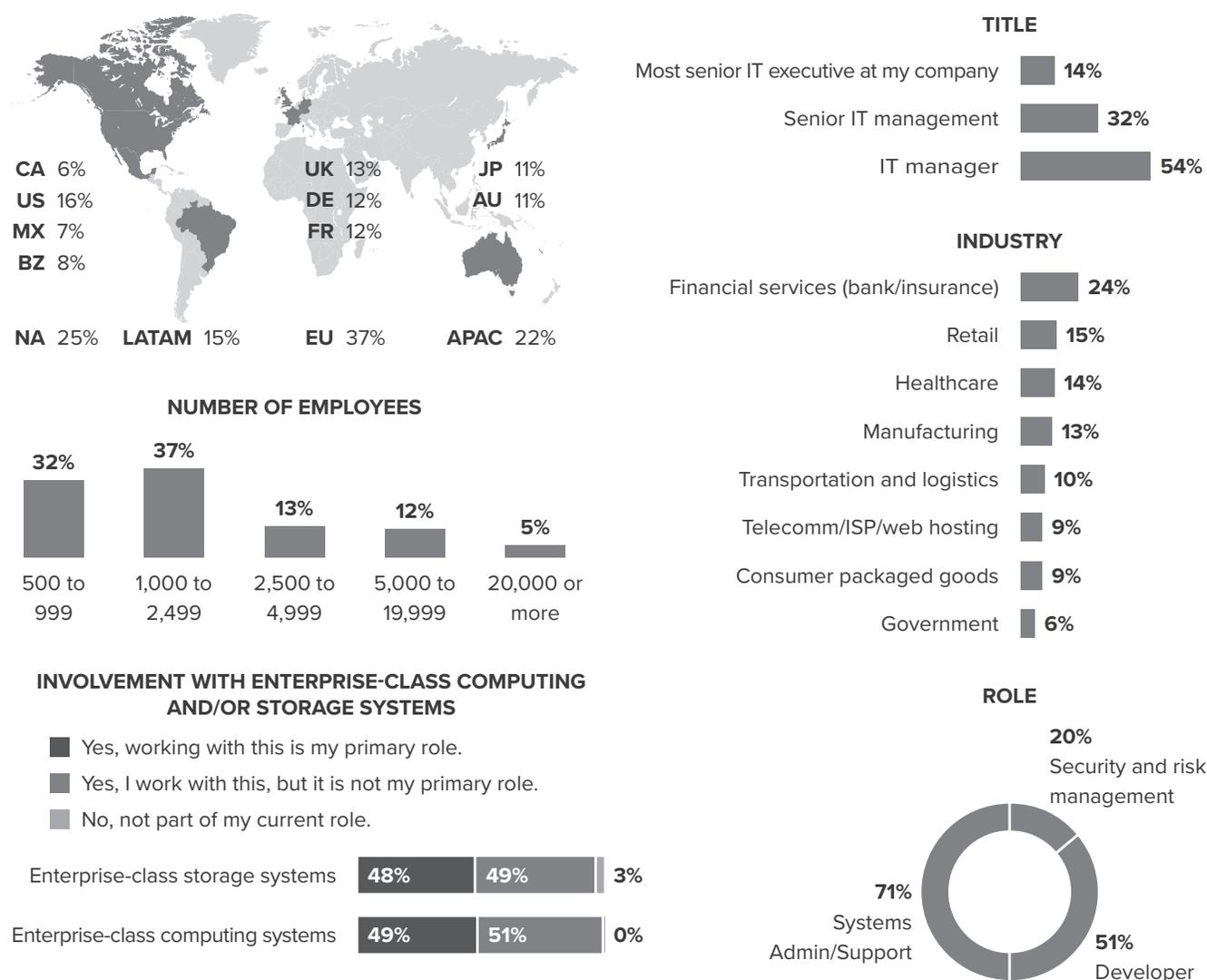
## Appendix A: Methodology

In this study, Forrester surveyed 412 IT decision-makers from companies in the United States, Canada, Mexico, Brazil, the UK, Germany, France, Japan, and Australia. Respondents were at the manager level or higher and were responsible for enterprise server, storage, and application development decisions. Respondents were all from companies in one of the following industries: financial services, retail, healthcare, manufacturing, transportation and logistics, telecommunications, CPG, or government. All companies surveyed were currently using at least one on-premises enterprise computer and/or storage system to support key workloads.

Forrester also conducted three, 60-minute in-depth phone interviews with IT leaders from an insurance company, government agency, and bank. Questions provided to the participants asked about current applications and modernization plans and challenges (covering both enterprise servers and storage as well as public cloud).

All participants were offered a small monetary incentive as a thank you for time spent on the survey and interviews. The study was completed in March 2021.

## Appendix B: Demographics



Base: 412 global decision-makers responsible for enterprise server and application development or deployment decisions

Note: Percentages may not total 100 because of rounding.

Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, March 2021

## Appendix C: Endnotes

<sup>1</sup> Survey respondents ranked their organization's modernization readiness on a scale of 1 to 5 based on how much they agree (5) or disagree (1) with the following statements:

1. Our enterprise servers are effective at managing current application workloads.
2. We want a consistent way to deliver applications to on-prem infrastructure and to one or more public clouds.
3. As we modernize our applications, we are also modernizing our development and DevOps tools.
4. We will retain complete technical control over our cloud-native stack by assembling and integrating it ourselves (i.e., from open source projects or best-of-breed providers).
5. We have the development talent and skills we need to modernize applications (e.g., build microservices, create containers, create API and events).
6. We have the testing and DevOps talent and skills we need to modernize applications (e.g., building DevOps pipelines, chaos testing, dark launching features).
7. We have the talent and skills we need to operate cloud-native applications (e.g., platform operations, storage and network management).
8. We have the talent and skills we need to secure cloud-native applications (e.g., network security, IDM policy, API security, observability strategy).
9. We have a significant number of IT automation processes in place to streamline operations.
10. We have robust policies in place to make sure enterprise data remains secure.
11. Delivering new capabilities faster is an important part of our modernization efforts.
12. We have a formal change management process in place to help employees learn and adapt to new processes and tools that result from modernization efforts.

Forrester aggregated the total scores out of a possible 60 points and divided the organizations into three maturity groups based on established thresholds.

<sup>2</sup> Net Promoter and NPS are registered service marks, and Net Promoter Score is a service mark, of Bain & Company, Inc., Satmetrix Systems, Inc., and Fred Reichheld.