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The Holistic Approach to Multicloud for Digital Operations

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About this paper

A Pathfinder paper navigates decision-makers through the issues surrounding a specific technology or business case, explores the business value of adoption, and recommends the range of considerations and concrete next steps in the decision-making process.

ABOUT THE AUTHOR

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Executive Summary

To become more effective, enterprises must fast-track projects to digitally connect their organizations. Building value and providing compelling customer experiences at lower cost requires more than a quick technology fix; it demands a business and technological commitment to a new target operating model (TOM). This operating model should offer a way of running the organization that combines digital technologies and operational capabilities to achieve improvements in revenue, customer experience and cost. Enabling digital capabilities via the TOM is an ongoing process that requires DevOps skills and agile development techniques. This is easier to achieve with partners that have the requisite capabilities to help with the creation of new digital assets.

One of the challenges of applying digital technologies is that companies often fall into the trap of using them to simply improve existing processes. Many organizations have already made some investment in cloud infrastructure and SaaS and have realized some business benefits. Yet, operationally, the organization does not *feel* transformed because it is not taking advantage of a multicloud or hybrid approach to transform the technology fabric, and it has not changed its operating model.

An organization's target operating model is the operational manifestation of its corporate vision and strategy – what it wants to do, how it wants to do it, and all the other associated execution details. Digital-era TOMs should be focused on the complete reimagining of the customer experience, an exercise that often reveals opportunities to simplify and streamline processes across the enterprise, potentially unlocking massive value. This can only be achieved where there is strong collaboration between business and IT units and an understanding of how DevOps and agile ways of working change the technology conversation. The best way to keep technology aligned with digital business goals is to pursue a multicloud strategy within a dynamic TOM.

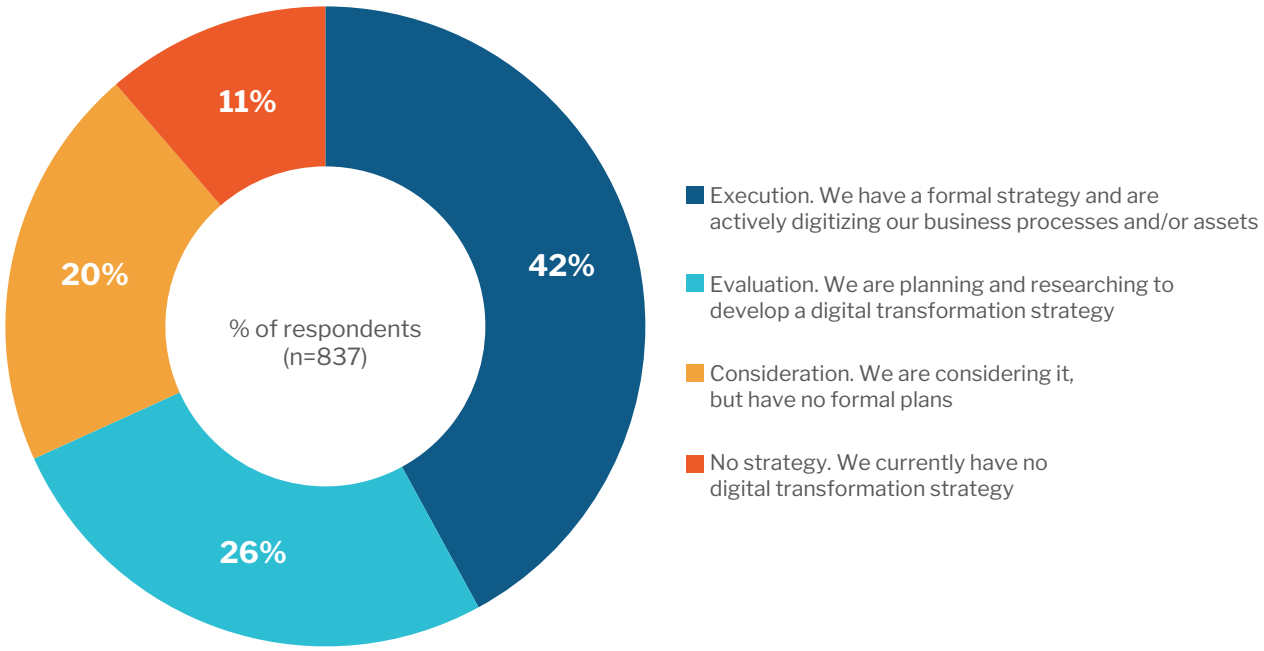
This Pathfinder looks at how to overcome cloud technology 'inertia' by viewing cloud not as a destination for 'digital stuff' but as a way to think and act differently as a business. Transformation of the IT function requires integrating a new TOM with the technology necessary to achieve it, thereby taking an architectural approach to a multicloud strategy that can keep the digital momentum growing within the IT department.

Maintaining Digital Impetus in the Enterprise

Organizations are continuing to respond to digital competition from cloud-native entrants, and according to 451 Research, a large minority (42%) are now strategically preparing for the changes they face over the next decade by digitizing business processes and assets (see Figure 1), while another 26% are in the research phase of planning their digital transformation strategy.

Figure 1: Digital transformation progress

Source: 451 Research's Voice of the Enterprise: Digital Pulse, Budgets and Outlook 2018



The major challenge facing all organizations is how to establish a systematic approach to innovation that will ensure a dynamic stance vis-à-vis transforming industries and continued market relevance. Typically, enterprises want to achieve faster time to market by creating rapid decision-making processes but find that significant technology effort continues to be applied to legacy systems just to keep existing operations running. For the 'change agents' within an organization, it can appear that the 'IT gatekeepers' are there to thwart the transformation initiatives urgently required to support more fluid collaboration across business functions. These challenges can be overcome by embracing new agile techniques such as business and IT co-creation modeling, hackathon development days, and workshops to explore the end-user experience and how it can be improved. The reimagining of processes can also be supported by new technologies to introduce automation and apply machine learning and other cognitive approaches to remove friction from workflows and processes.

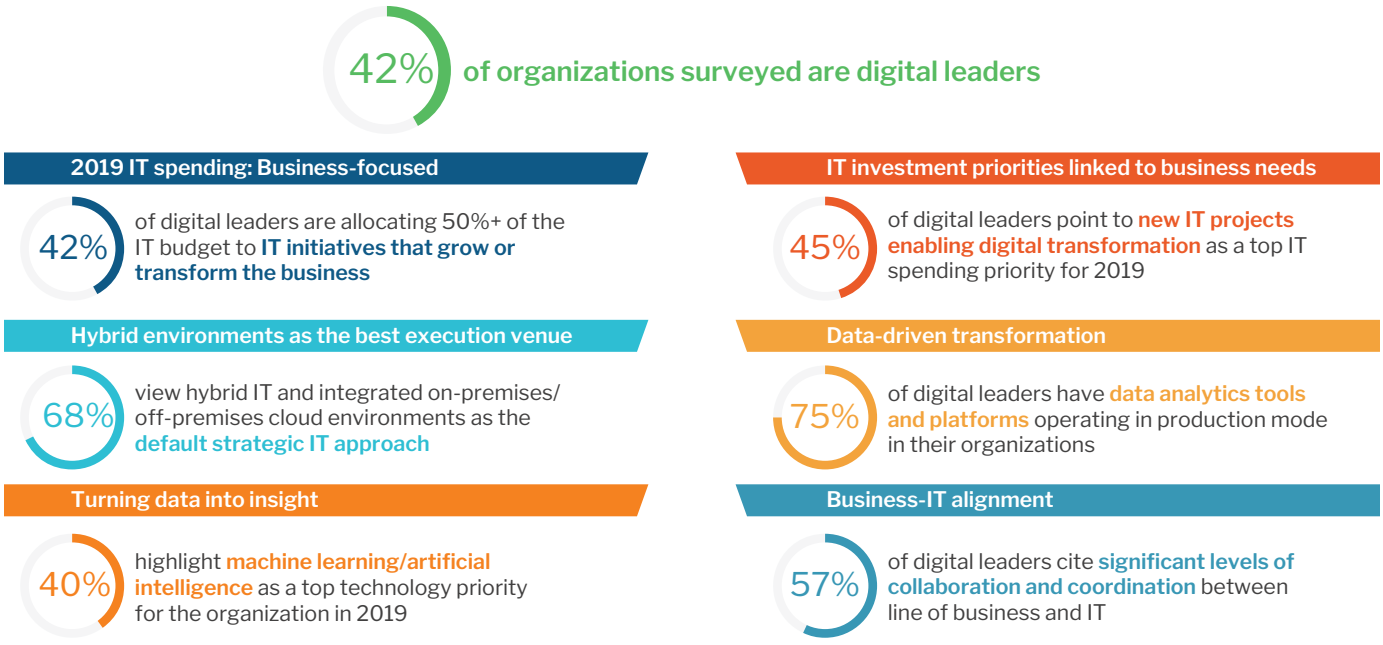
Many organizations have already invested in improving their customer experience processes and technology by adopting cloud delivery approaches to enable more flexible consumer access to goods and services, and to facilitate any device, anytime, anywhere customer support. Often, the customer-facing processes themselves will be expedited to ensure faster, more responsive applications for consumers. And yet, despite this investment and despite migrating business applications to cloud infrastructure, enterprises know they are not yet operating in a 'cloud-native' way. They feel that although they have adopted a cloud-first strategy for applications and infrastructure, they are stuck in old business models and are losing the momentum in moving toward a more digital future.

More often than not, this is because enterprises have, over time, developed change-resistant processes that defeat efforts at business nimbleness and can cripple progress toward a new TOM. However, even if it were feasible to completely abandon 'the established ways of doing things,' this would not be the wisest course of action. After all, enterprises have a deep knowledge of the markets that they operate in; they have highly skilled and committed employees, financial resources, existing customer bases and established brands, as well as tried and trusted operational processes that comply with regulatory requirements. From a digital perspective, all these qualities need to be taken forward to the new TOM.

Organizations can achieve this by leveraging software and data in a programmed, automated manner. Data from 451 Research's Voice of the Enterprise: Digital Pulse indicates where the companies characterized as digital leaders are in terms of applying digital technology to transform themselves (see Figure 2).

Figure 2: Digital Pulse snapshot

Source: 451 Research's Voice of the Enterprise: Digital Pulse, Budgets and Outlook 2019



Organizations have made dramatic investments in legacy business systems from vendors such as SAP and Oracle, and understandably, this creates an imperative to keep these systems in use, an approach that can end up undermining the overall agility and flexibility that companies want to achieve. At stake is more than the sunk costs of hardware, software and code; there is also the cost of working inefficiently due to outdated technology – the technical debt of inefficient processes needs to be factored in.

However, 42% of the digital leaders identified by 451 Research are allocating 50% or more of their IT budget to growth and transformation projects. More than two-thirds see hybrid IT and multicloud environments as the best way to run business applications. Yet, to successfully use cloud services to transform themselves, enterprises need to undertake enormous organizational, operational and technical modifications. The good news here is that there is an increase in the level of collaboration and coordination between lines of business and IT among digital leaders. This is where a new TOM becomes hugely helpful because it is the best way to plan for these modifications while taking into consideration the influencing constraints such as budgets, the need for exponential scale, and the growing complexity in company policies and external regulations.

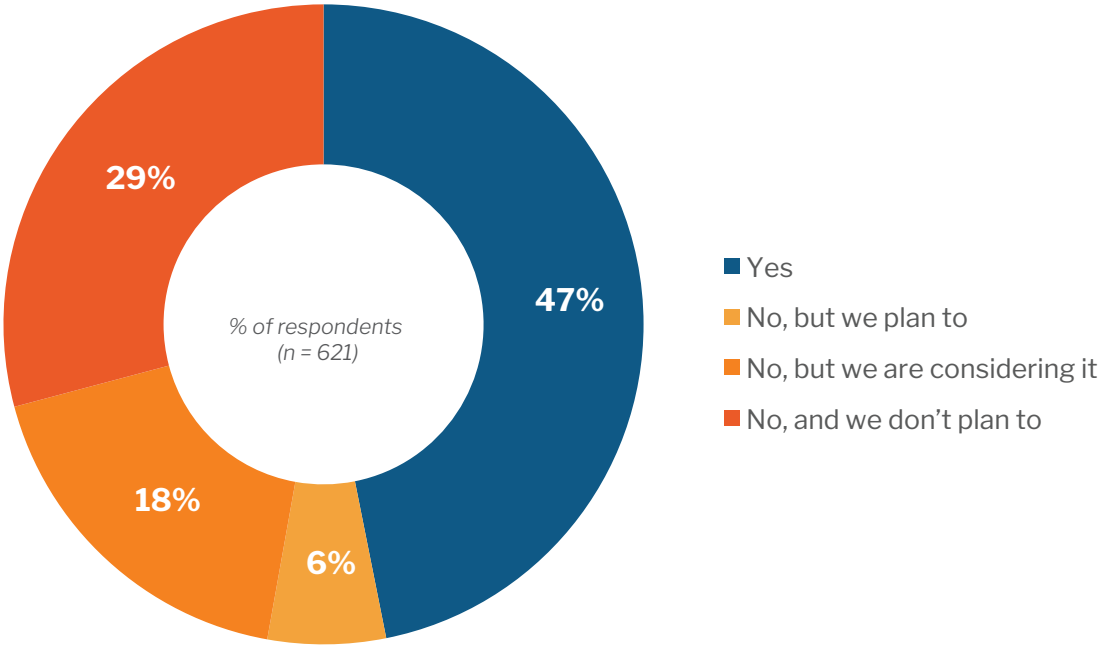
In order to operate as agile digital entities, organizations need an integral link between the new TOM and the growing investment in cloud. That link is created by establishing a composable architecture to support the execution of the digital initiative's target operating model.

The Digitization of the Workload

As Figure 3 shows, 451 Research finds that digital-era IT for the enterprise will be hybrid and multicloud with a continued role for on-premises IT. However, while the direction of travel is clear, there is no one-size-fits-all cloud approach to digital transformation. Each CIO must decide on a methodology that provides the most secure, compliant and cost-appropriate approach to meeting the demands of the organization.

Figure 3: Multiple infrastructure environments in the operation of various workloads

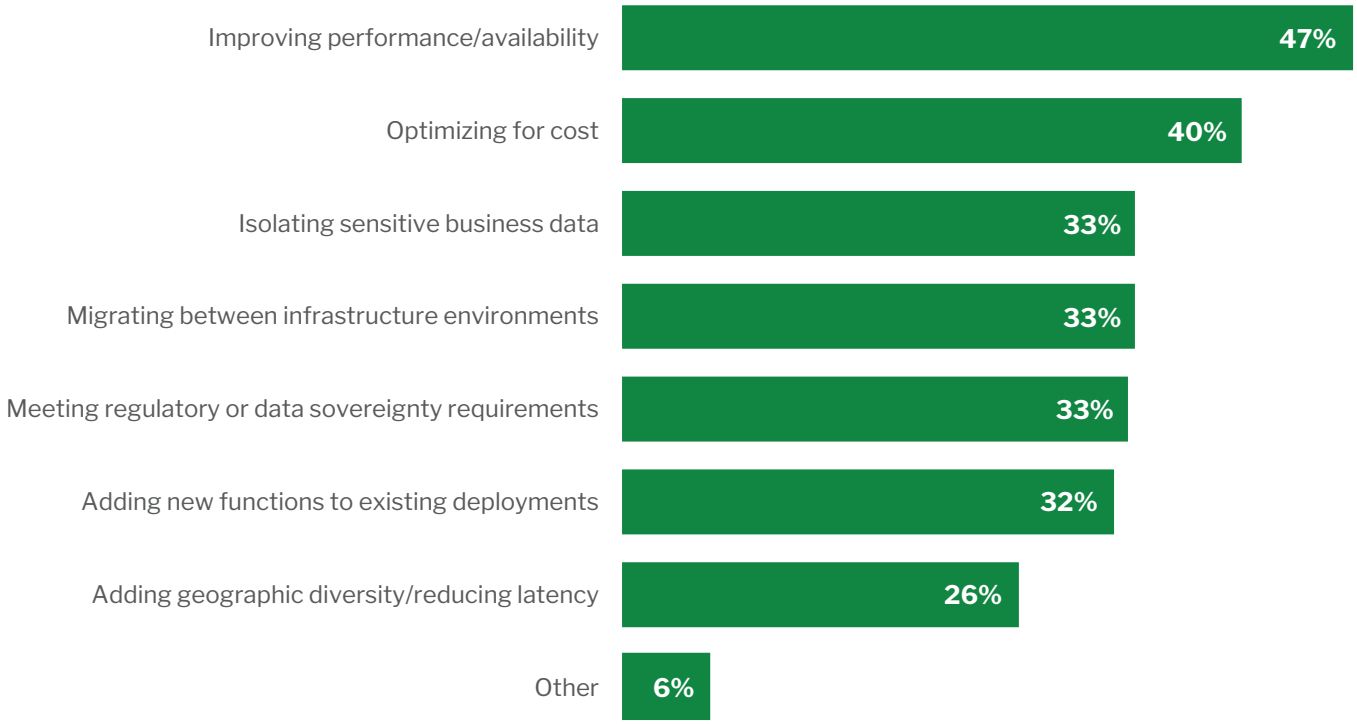
Source: 451 Research's Voice of the Enterprise: Cloud Hosting and Managed Services, Workloads and Key Projects 2018
Q: Is your organization currently using multiple infrastructure environments in the operation of (workloads)?



Factors to consider when deciding where workloads should sit (see Figure 4) include the types of external and internal users that depend on the workload, how much the service currently costs to operate versus how much it would cost to run in the cloud, as well as the regulatory, customer, or partner data gravity and security considerations associated with the workload and the business function it enables.

Figure 4: Reasons for multiple infrastructure environments in the operation of workloads

Source: 451 Research's Voice of the Enterprise: Cloud Hosting and Managed Services, Workloads and Key Projects 2018
Q: Which, if any, of the following best describe your organization's reasons for using multiple infrastructure environments to operate (workloads)? Please select all that apply.



Given that multicloud is becoming the new normal for IT, enterprise workloads are on the move. While each organization will need to weigh different factors to determine where its various workloads should sit, some trends are emerging for how enterprises are planning their spending. 451 Research has found that enterprises are focusing their multicloud and hybrid IT strategies on two areas. First, they are being applied to specialized industry business processes such as customer onboarding, credit checks and drug approvals, and to corrective and preventive maintenance – all of which are easily identifiable areas of business value and differentiation.

Second, multicloud and hybrid IT approaches have strong appeal for data processing, analytics and BI functions. Despite the benefits promised by public cloud, most enterprises can't realistically move all their data off-premises because the datasets are too large to move in bulk and/or regulatory, privacy or security requirements demand that the data be kept on-site.

As a result, the predominant IT pattern for many years to come will be hybrid/multicloud – mixing traditional IT with a growing collection of on-site and off-site environments featuring multiple private cloud and public cloud deployments. The multicloud dimension (i.e., the use of multiple public and private clouds from a variety of vendors and service providers) will also take root in enterprise IT environments, making it essential for organizations to determine whether their clouds are integrated in the most strategic manner. Hybrid cloud services consist of multiple workloads where some workloads operate on separate infrastructure from other workloads. A

typical example is where some workloads are on-premises and others are located on a major public cloud provider. None of the workloads accomplishes a complete task individually, but together, they form a single solution that ensures the data resides in the most effective location for application performance and compliance.

A multicloud service can be either a hybrid service (where data is processed on multiple infrastructures at the same time), or a solution in which data is processed on multiple clouds in sequence. Either way, a multicloud solution typically has to make vast quantities of data available across multiple infrastructures. Clearly, developing software for this type of environment requires change within IT teams.

DevOps and 'Multicloud Native' IT Transformation

The embedded technology challenge of digital transformation lies with the shift in software development and the rise of virtualization. Taking a multicloud approach is tightly coupled with agile practices, DevOps and microservices to enable dynamic business needs. Applications need to be multicloud-aware, and there needs to be a well-understood set of development requirements for a cloud-native application.

A multicloud-native application is designed so that microservices components can be deployed on multiple, potentially heterogeneous clouds and still work in an integrated and transparent way for the end users. In contrast to a traditional cloud-native application, the goal here is not to replicate and allow for redundancy by using multiple clouds but, rather, to design for distribution, agility, velocity, fast disaster recovery, and the fulfilment of non-functional requirements, i.e., business needs. These non-functional IT-agnostic requirements, as well as application SLAs, need to be respected when considering the resilience and portability of the components or microservices being created. The application's components or microservices should work together in an integrated manner with their endpoints managed and discoverable to enable the switching of hosts with the necessary change of location and IP addresses.

Although the ability to have portable microservices is important, the ability to achieve seamless and cost-effective data migration and replication is equally vital. Furthermore, the ability to take advantage of vendor-specific SaaS and IaaS services should be possible even though each service provider will be using different APIs and data storage. And, in a multicloud environment, the dynamic reconfiguration of application properties should occur with no application downtime.

In order to address these challenges, enterprises need to look at architectural patterns for solving commonly occurring problems. A pattern-based design can also simplify and guide developers in the use of their chosen DevOps framework to avoid common pitfalls during the design phase of the application lifecycle.

Turning Legacy Apps into Heritage Multicloud Software

Some existing applications that were designed as tightly coupled monolithic systems can be modified to take advantage of cloud features to give them a new lease on life and new purpose. This is usually easier said than done because the applications will typically need to be redesigned, recoded and repurposed for cloud delivery, so it is highly important to analyze existing applications to determine which are good candidates for a refactoring investment. Basically, the application will need to be enabled to externalize APIs and take advantage of microservices, while containers can assist in making the refactored code portable for multicloud environments.

The use of containers to 'wrap' existing legacy applications removes the dependencies on the underlying infrastructure services, which reduces the complexity of dealing with those platforms. This means that access to resources, such as storage, can be abstracted from the legacy application itself. This makes the application portable but also speeds the refactoring of the software since the containers handle much of the access to native cloud resources. The legacy application also needs to be decomposed to its functional primitives and rebuilt as a set of services that can be used by other applications as well as the legacy application itself. This has the advantage that services can be consumed from rebuilt legacy applications so that functionality, such as customer address validation, does not have to be built from scratch.

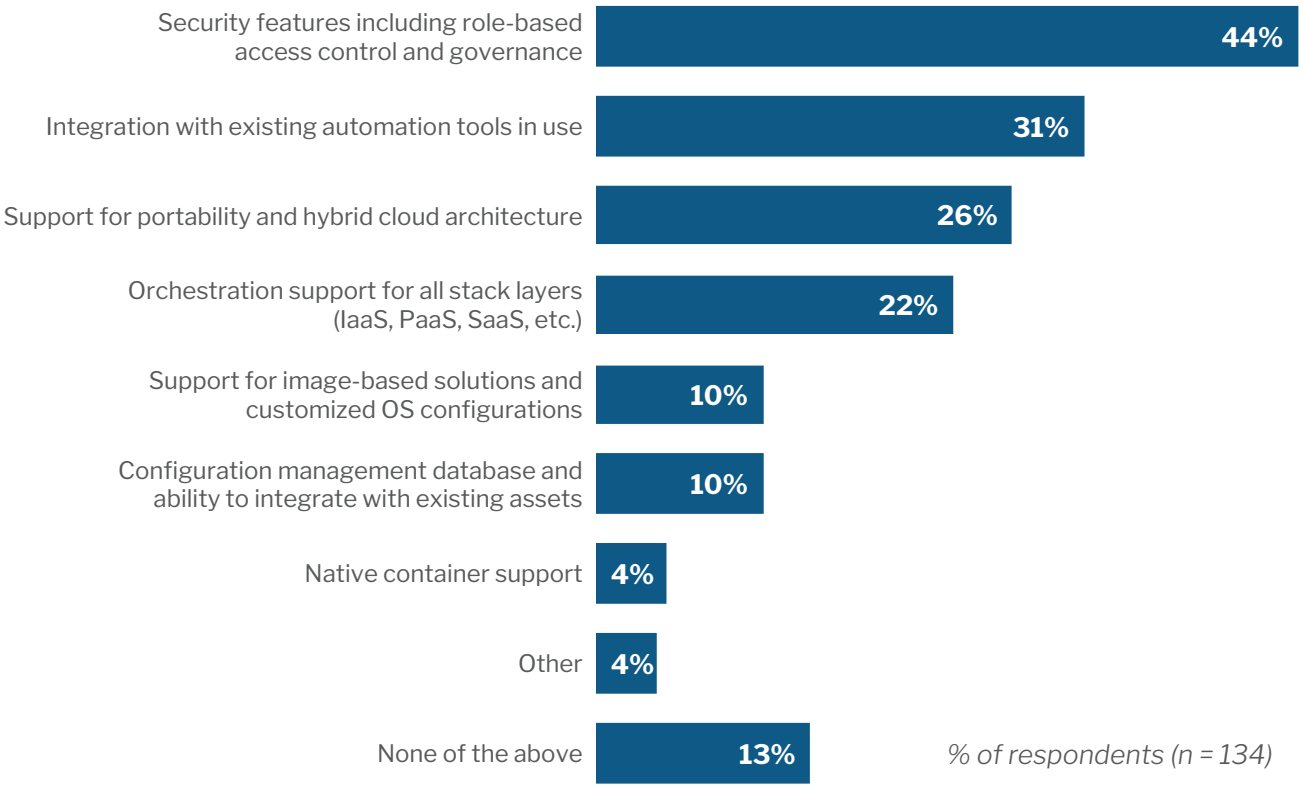
Cloud Management

Aside from the need for an architectural design approach for developing multicloud-native applications, there is an equally important requirement for enterprises to have a cloud management strategy covering the software and technologies designed for operating and monitoring applications, data and services residing in the cloud. Cloud management tools help ensure that cloud-computing-based resources are working optimally and interacting properly with users and other services. Cloud management strategies typically involve numerous tasks, including performance monitoring (response times, latency, uptime, etc.), security zone management, compliance auditing and management, billing, and initiating and overseeing disaster recovery and contingency plans.

As Figure 5 shows, those organizations using a cloud management platform rate security and governance features most highly, but support for portability and hybrid cloud architecture is rising in importance. With cloud computing growing more complex and a wide variety of private, hybrid, and public cloud-based systems and infrastructure already in use, a company's cloud management tools need to be just as flexible and scalable as its cloud computing strategy.

Figure 5: Most important cloud management platform capabilities

Source: 451 Research's Voice of the Enterprise: Cloud Hosting and Managed Services, Workloads and Key Projects 2018
Q: Which of the following capabilities are most important to your organization in its selection of cloud management consoles? Please select up to 2.



Planning for AppOps Requirements

Once a multicloud-native architecture and framework is in place to guide the design and development of applications and a cloud management platform is in place to ensure robust multicloud management capabilities, it's important to be mindful of the requirements of application operations (AppOps). AppOps prescribes the sequence of actions needed to build production-ready applications by applying the principles of continuous integration, continuous deployment, logging, metrics and error handling.

While cloud service management and operations are addressed by the cloud management platform, service management in the AppOps context refers to the operational aspects of the application and its services that need to be integrated in cloud-based delivery for production. As methods of developing, testing and releasing new functions become more agile, AppOps service management must also transform to support this paradigm shift, managing application services from multiple application teams. This transformation impacts several activities.

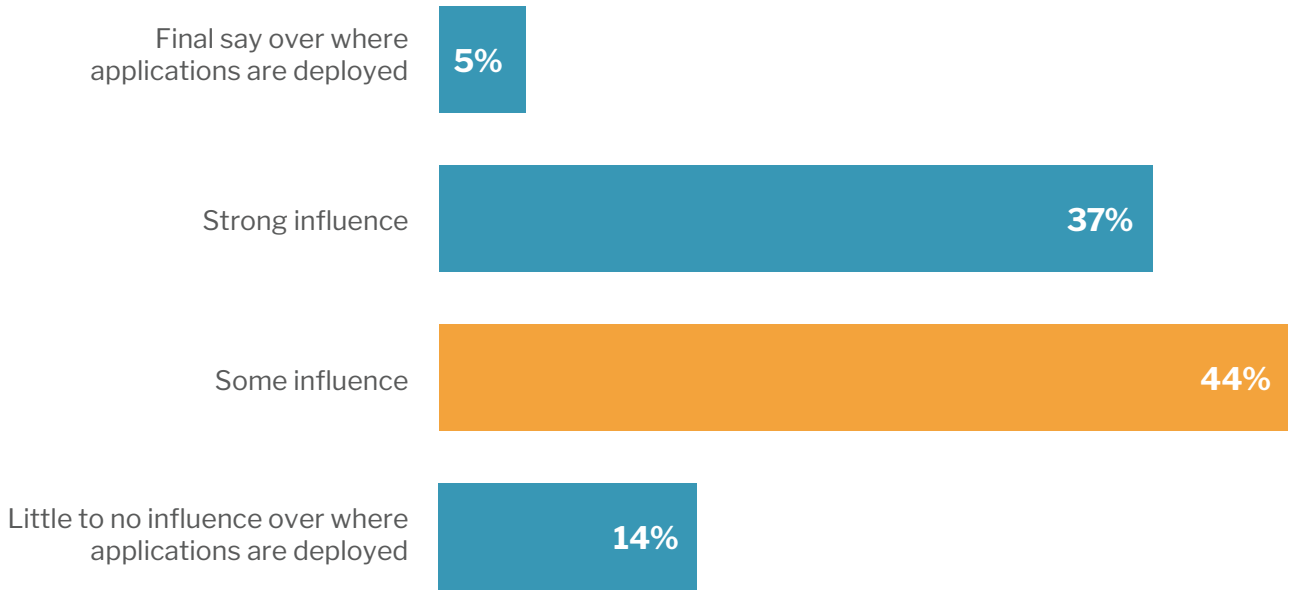
For a start, instead of a separate operations organization that is distant from the development team, full lifecycle responsibility can be provided through small DevOps teams. Another approach is site-reliability engineering (SRE), which brings a strong engineering focus to operations. SRE emphasizes automation as a way to scale operations as the load increases. For example, site-reliability engineers will spend about half of their time doing 'ops'-related work such as incident management, on-call support and manual intervention. However, given the level of automation in the software system, the site-reliability engineers should spend the remainder of their time on development tasks such as new feature development, scaling and automation. The ideal SRE candidate is a highly skilled system administrator with knowledge of both code and automation.

As organizations reorient their business and IT operations toward digital operations, application developers need to take on a more active operational role. Many enterprises are unifying these two disciplines to establish DevOps, and they often require tooling to help ensure operational rigor as this unification proceeds. In the most digital-forward businesses, application development and IT operations live within the same organizational structure, and developers are instrumental in deciding the IT environments in which applications get deployed. Figure 6 shows that among the digital leaders in the 451 Research panel, 42% of developers in these organizations have either a strong influence or final say over where applications are deployed.

Figure 6: Application developers' role in application deployment environments

Source: 451 Research's Voice of the Enterprise: Digital Pulse, Organizational Dynamics 2018

Q. How much influence do application developers have in choosing the IT environment where applications are ultimately deployed?



Building new digital assets requires the people, processes and technology to be able to quickly build prototypes and then create minimum viable products to test both the ideas and the software. Exploring these new ways of working is often best done initially within a workshop or garage environment, which can be provided by technology partners that may also be able to provide on-demand dev-test environments to support the work undertaken in these intensive small-scale innovation projects.

Continuous code deployment needs a robust and repeatable deployment method, and once an application is running on servers, gathering insights into how it is operating is essential. This means that it is important to log application metrics and error handling, and it's important for developers to have a view of how the application is working.

Working with distributed teams can be a challenge for development discipline, especially if team members operate in different time zones and speak a variety of native languages. Nevertheless, the workflow of digital initiatives is not simply about developing code, shipping and forgetting. Requirements evolve continuously, and success means having a well-integrated team that can incorporate the post-release analysis and feed the insights back to the team and into the next phase of iteration. The team should understand how certain features are being received by users, as well as sprint metrics and the most up-to-date release dates.

Because speed is crucial in restoring a service, incident management tools must provide rapid access to the right information, support automation, and facilitate instant collaboration with the right subject-matter experts. The term *ChatOps* has been coined to describe a collaborative way of performing operations with bot technology, thus integrating service management and DevOps tools as part of this collaboration culture.

Indeed, successful transformation projects typically have a blameless post-mortem culture where the root cause of an incident is revealed so that the organization can learn from it. This is particularly important for an agile, digital operation capable of taking the 'fail fast' mantra to heart in order to make progress.

The Impact of Software-Centric Skills on Organizational Culture

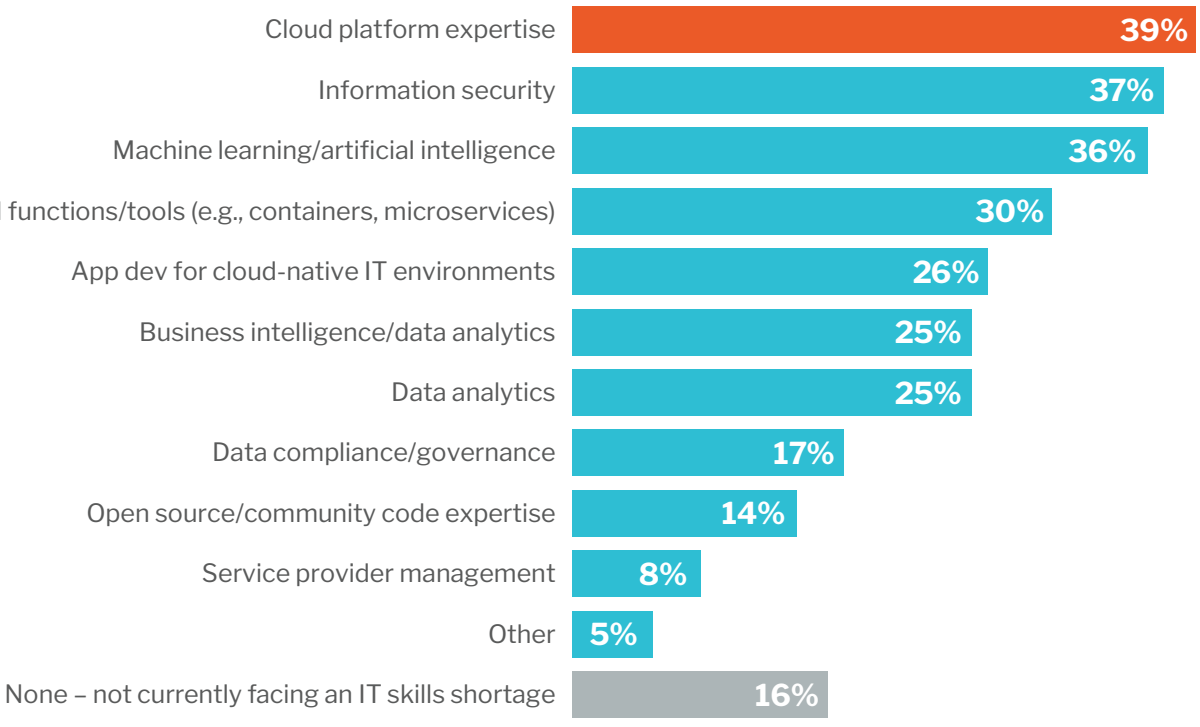
Digital transformation continues to drive changes in IT organizational structures. The expansion of digital business requires new IT skills, responsibilities *and* mindsets. While 451 Research finds that 'digital leaders' lean toward centralized IT departments and dedicated IT staffs, digital transformation cannot occur without broader, organization-wide input into technology spending, application strategy and vendor-selection decisions. Organizations that are positioned to thrive in the digital era have found the optimal balance between top-down, command-and-control IT (unified platforms and information security) and bottom-up flexibility and autonomy (agility and innovation). One way of establishing that balance within the enterprise for digital transformation is to establish an internal center of excellence, which has the authority and experience to address issues as they arise, as well as to popularize successful ways of working.

The imperatives of digital transformation require new cloud- and data-centric IT skills, as well as information security expertise tailored to the digital era. Yet, skills gaps exist across multiple technology domains, and this is one of the drivers for enterprises to work with external partners. Indeed, only 16% of organizations report having no IT skills shortages (see Figure 7).

Figure 7: Areas of IT skills shortage

Source: 451 Research's Voice of the Enterprise: Digital Pulse, Organizational Dynamics 2018

Q. In which of the following IT categories, if any, is your organization currently facing an acute skills shortage? Please select all that apply.



Large enterprises, digital transformation 'planners' and retail sector respondents cited the broadest swaths of IT skills deficits, indicating that these organizations are at the forefront of those who 'know what they don't know.' Cloud platforms and information security continue to top areas of IT expertise gaps while cloud-native application development and machine learning/artificial intelligence are moving up the ranks.

Creating the Digital Operating Model

At its heart, digital transformation is an organizational challenge embedded within a technology challenge. The organizational challenge involves overcoming the temptation to simply improve upon the existing business model rather than establishing it as the departure point for reimagining the entire business process. Cloud is the route to the new service-driven, digital-operations-focused business models, creating IT environments that allow for iterative business value innovation and new levels of anytime/anywhere/any device customer satisfaction while also reducing the cost of IT operations and enabling a collaborative 'fail fast, implement fast' approach. This means embracing DevOps, rapid cloud-native application development, and potentially refactoring parts of the legacy application estate. Importantly, it also requires the processes and methods to move quickly from small-scale innovation to production-ready applications.

The role of technology in an enterprise's digital transformation journey should be to both enable and support the reimagining of the business to create the conditions for an evolution toward a digital operating model. It should not simply be about automating and speeding up what the organization already did before disruption by cloud-native entrants. Technology should also open up new possibilities, and this requires the close alignment of business and IT stakeholders around a new TOM and a whole new way of working for *both* IT professionals and business executives.

Operational innovation is achieved by linking a company's business strategy to all of its operating elements. In the digital era, this also requires tight alignment with a transformed technology capability, encompassing multicloud application development methods, cloud management platforms, agile project management and standardized tooling. Without this technology transformation, an enterprise's processes will not be capable of supporting its digital business vision.

As 451 Research data shows, very few organizations have the skills and experience in-house to enable a digital transformation project or program without external support. In undertaking a multicloud approach to digital operations, it is important to be able to work with a partner that understands the holistic digital business chain and can plan and implement an end-to-end transformation aligned with your target operating model and with an understanding of your current environment.

Every enterprise needs a trusted partner who will bring in a rich suite of services, domain leadership, method & tooling, rich assets and accelerators, experience, skills and a successful history of executing complex transformation programs. Enterprises also need guidance in establishing a target operating model aligned with cloud journey, consortium formulation and leadership support in executing the transformation programs. Last but not least, they need a strong suite of industry solutions and associated partnerships.

IBM Services has the ability to help enterprises in their multicloud transformation journeys. Through IBM Garage Method for Cloud, IBM Services offers a systematic, experience-driven end-to-end cloud transformation method starting with advisory and continuing through migration, modernization, cloud native development and operation. IBM's Garage Method for Cloud toolkit offers a "multicloud" suite of homegrown and partner tools that's designed for multicloud scenarios. The toolkit helps not only migrate efficiently, but also modernize and operate apps in a true "cloud" way.

IBM Services offers industry-leading DevOps services through which it bundles hybrid and multicloud toolchain and associated services including MVP to Scale models that help adopt DevOps quickly and scale this across the enterprise.

IBM Services has a strong multicloud practice that has significant expertise and delivery credentials across popular cloud providers (Red Hat OpenShift, AWS, Azure, Google Cloud, and IBM Cloud).

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