The Transformative Impact of the Cloud

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ABOUT 451 RESEARCH

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Executive Summary

Cloud computing is rapidly entering an entirely new phase – one destined to prove far more transformative and disruptive than the initial phase of cloud deployment. Cloud is driving a comprehensive transformation of digital assets in organizations of all stripes as IT decision-makers begin to view the emerging cloud construct as a proxy for the transformation of IT itself.

This sea change is provoking heavy enterprise investments in both on-premises and third-party cloud infrastructure. This is one of the key findings of a global study of 1,155 organizations conducted by 451 Research. For the foreseeable future, enterprises will remain dependent on infrastructure deployed on-premises. In fact, on-premises private cloud will be the primary deployment model over the next two years for seven of eight enterprise workloads examined in this study.

Spending on automation and orchestration – the key building blocks of an on-premises private cloud –will jump 11% over the next 12 months, while spending on virtualized infrastructure will grow about 9%. Conversely, study respondents indicate that spending on standalone non-virtualized infrastructure will plummet 13% in the same period. 451 Research believes the robust spending on cloud-enabling technologies (CETs) is also being driven in part by the need for organizations to build the on-ramp to a hybrid cloud. The building blocks for this include management, platforms and brokering technology. For management and platforms, a majority of study respondents indicate increased spending intentions in 2016, while 30% of those surveyed plan to increase spending on brokering, an emerging capability that continues to pique the interest of forward-leaning enterprises.

In tandem with this, applications and correlated spending will be spread across a plethora of third-party-hosted service-delivery venues, including traditional hosting and public and private clouds. Results from the study indicate that 72% of organizations say that cloud will become the primary application deployment method over the next two years. Roughly one-third of those cloud-deployed applications will be delivered via on-premises cloud infrastructure, while the remaining two-thirds will be delivered via a third-party service provider. Results from this survey, as well as objective 451 Research insights from multiple data sources, show that private cloud, delivered on-premises and via third-party providers, will be the preferred enterprise deployment model.

In this increasingly multi-sourced world, is there directional guidance that can be gleaned regarding the 'right mix' of cloud infrastructure (i.e., an appropriate mix of private and public cloud)? Study results reveal that a pattern has indeed emerged across a broad range of organizational types and vertical markets in terms of this ideal mix of private and public cloud resources – roughly 74% private and 26% public, with 'private cloud' defined as including both on-premises and third-party-hosted resources. However, this mix is dynamic, and only directional in nature. 451 Research believes that the 'right' cloud mix in the future will be highly influenced by a diverse range of factors, most notably the nature and character of individual applications, and the risk posture and strategy of the organization.

METHODOLOGY

451 Research surveyed 1,155 technology and business decision-makers across nine countries and eight vertical industries. Of the total number of respondents, 88% held management or executive titles, with 28% in C-level positions. More than 70% said they have significant decision-making authority regarding IT. In terms of organizational size, 60% of responding companies reported annual revenue in excess of $500m.

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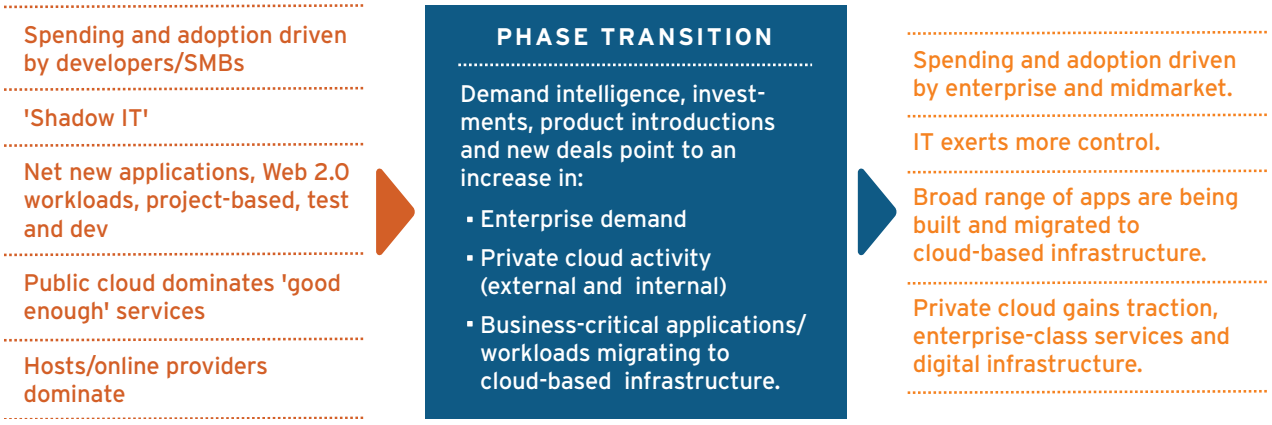
I. CLOUD: A PROXY FOR IT TRANSFORMATION

Cloud use is rapidly evolving, and so too are the technologies that enable it. Enterprises that have capitalized on 'Cloud 1.0' or previous generations of cloud computing are now embarking on a more concerted strategic IT transformation that spans on-premises resources and a variety of third-party hosted services.

Our demand intelligence shows that a phased transition is well under way, which we at 451 Research characterize as the emergence of 'Cloud 2.0.' Enterprises of all sizes are maturing in their use of cloud-enabling technologies (CET) deployed on-premises and in their use of third-party delivery models. This comes in response to many factors, including an increased need to deploy more mission-critical applications and growing cloud adoption by larger, more complex and demanding firms. Our data from this study shows that spending for on-premises and hosted private and public cloud is evenly distributed across companies of all sizes. Pure adoption of hosted public cloud ranged from 40% to 51% of cloud budgets in the study. For hosted private cloud, the range is 40% to 60%. For CET virtualization, automation and orchestration, the percentage of cloud budgets ranges from 35% to 40%.

The evolution of Cloud 2.0 represents a multiyear transition. The technology implications of this transition are profound. IT will be forced to exert more control and become less risk-averse. As a result, we believe enterprises will increasingly opt for a mix of private cloud solutions that are deployed on-premises or delivered via third-party services. Results from our survey show that nearly three-quarters (72%) of organizations polled say that cloud will become the primary application deployment method within just two years. And of those cloud workloads, just over three-quarters will be deployed in private clouds (on-premises and hosted private cloud).

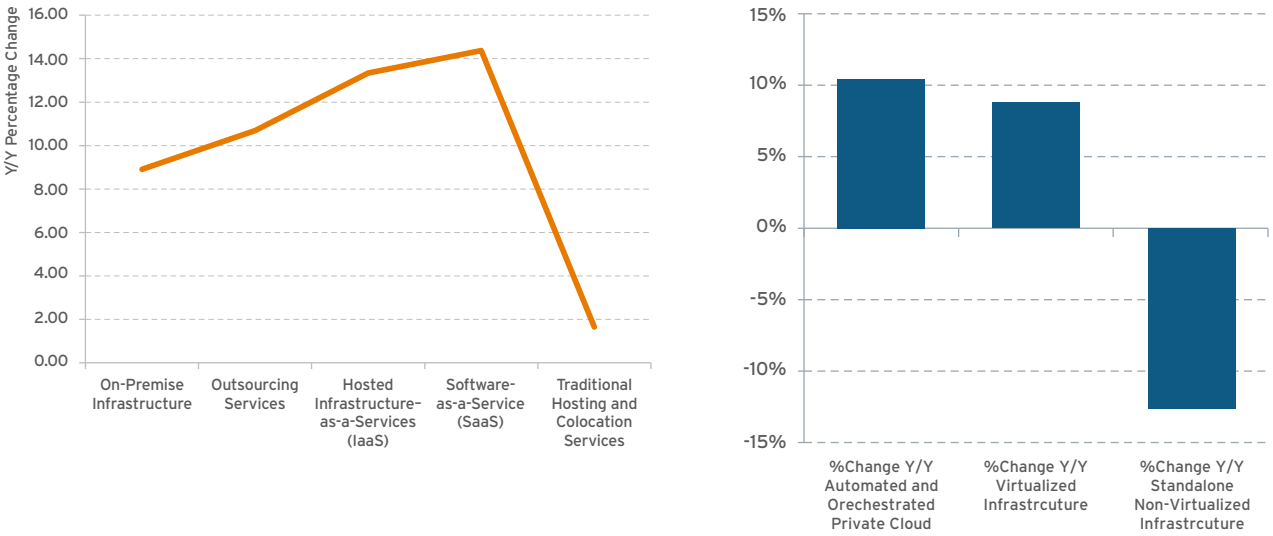
Figure 1: Cloud Market Matures



II. CLOUD EFFORTS SPAN ON-PREMISES AND THIRD-PARTY HOSTED SERVICES

The 451 Research survey shows a clear trend toward a dual strategy of increased spending on both on-premises and third-party-delivered cloud services, as indicated in the year-over-year budget change chart (Figure 2). From 2015 to 2016, respondents indicate that the largest change in third-party spending will be on hosted cloud services, which will grow as a percentage of total IT budget by 14%. Additionally, enterprises are 'cloudifying' their on-premises infrastructure by increasing spending in 2016 on automation and virtualization technologies at the expense of stand-alone non-virtualized infrastructure.

Figure 2: IaaS (Public and Private) See the Largest Spending Increase as Companies Transition



III. THE 'CLOUDIFICATION' OF ENTERPRISE ON-PREMISES IT

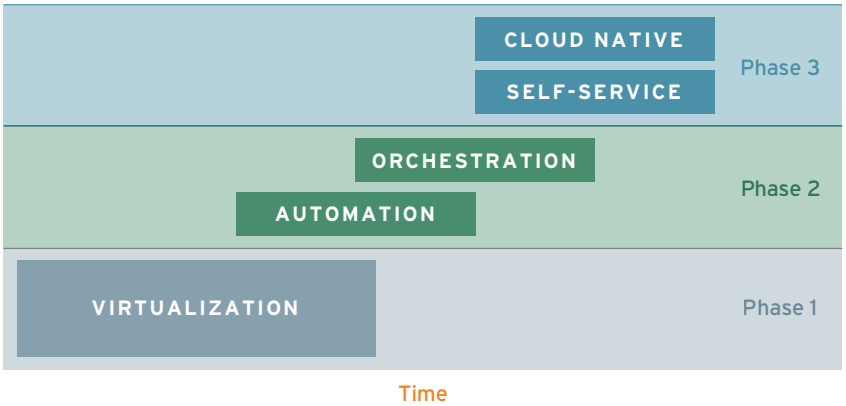
Forward-leaning enterprises are building flexible, agile and scalable on-premises private cloud environments that can compete with third-party cloud providers. For the time being, fear, uncertainty and doubt around security issues will continue to drive private cloud funding, but IT departments are under constant pressure to benchmark costs and effectiveness against third-party-delivered services. Survey results show that 10% of respondents believe their on-premises cloud is significantly more expensive than third-party services. Nearly half, or 47%, said it was only slightly more expensive, while 15% said slightly less expensive, and 27% said significantly less expensive.

These study results mirror the wealth of anecdotal and other hands-on information gathered by 451 Research. Enterprise IT departments are continuing to evolve on-premises private cloud services, which are at the forefront of enterprise IT transformation. Of those surveyed, 44% say that the bulk of their time and resources is spent on automation and orchestration as IT infrastructures mature. Few study respondents say they are focused on self-service, which may be indicative of placing this capability in the hands of a third party.

Figure 3: The Emerging Digital Infrastructure Spans Internal and External Environments

Where is your company focused today based on primary work effort and spending?

CLOUD NATIVE	6%
SELF-SERVICE	7%
ORCHESTRATION	18%
AUTOMATION	26%
VIRTUALIZATION	43%

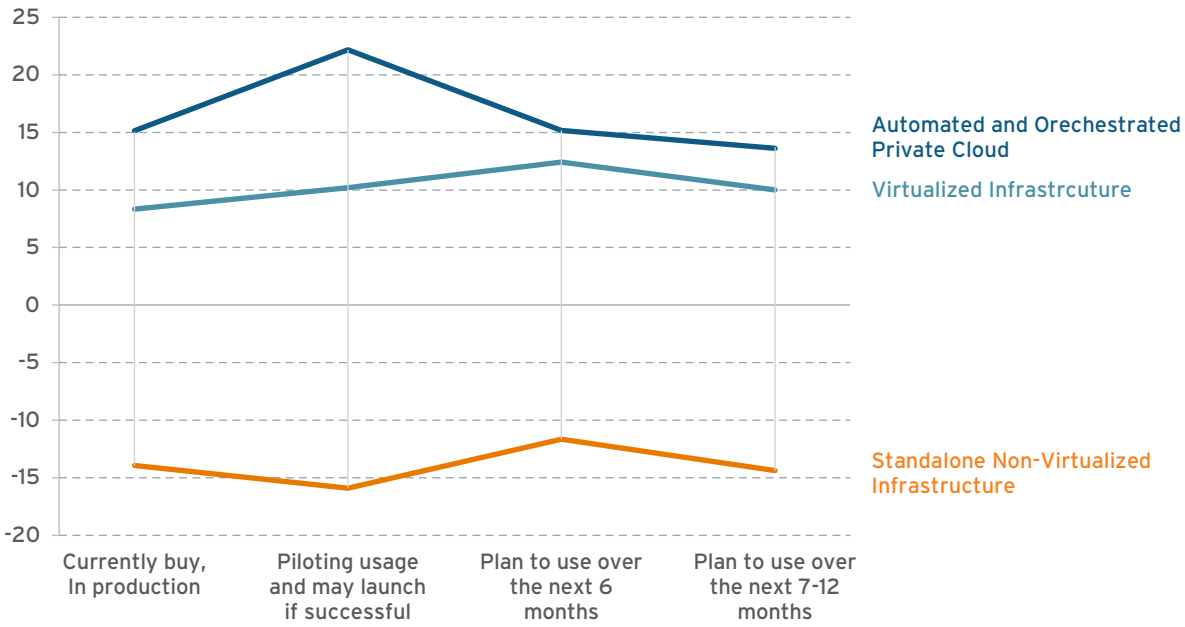


The maturity of on-premises clouds is best evaluated across three phases, as noted in Figure 3:

- Phase 1: Server virtualization (hypervisor and administration) offers less IT overhead and more efficient computing options. Management, automation, and data and application protection are critical in order to realize the benefits of – as well as manage and control – a virtualized cloud environment. In our study, 43% of respondents spend the bulk of their time, budget and resources on these virtualization-related efforts.
- Phase 2: In this phase, internal IT departments deploy automation and orchestration to further streamline their infrastructure. Of those surveyed, 44% say they are spending the most time, budget and resources on Phase 2 efforts.
- Phase 3: In this phase, internal IT departments are adopting the position and mentality of external service providers, delivering a combination of on-premises and hosted resources to their organizations. This shift is driving the development and expansion of internal private cloud platforms complete with flexible infrastructure capabilities and cost/chargeback granularity.

Figure 4 shows on-premises cloud spending juxtaposed against third-party private-cloud maturity. Between six and 12 months prior to third-party cloud deployment, spending on virtualization and automation and orchestration increase as a percentage of IT budgets. Spending on automation and orchestration is a much larger percentage of IT budgets as respondents move into the pilot phase, and spending on virtualization peaks six months prior to third-party private-cloud deployment.

Figure 4: On-Premises Cloud Spending vs. Third-Party Private Cloud Maturity

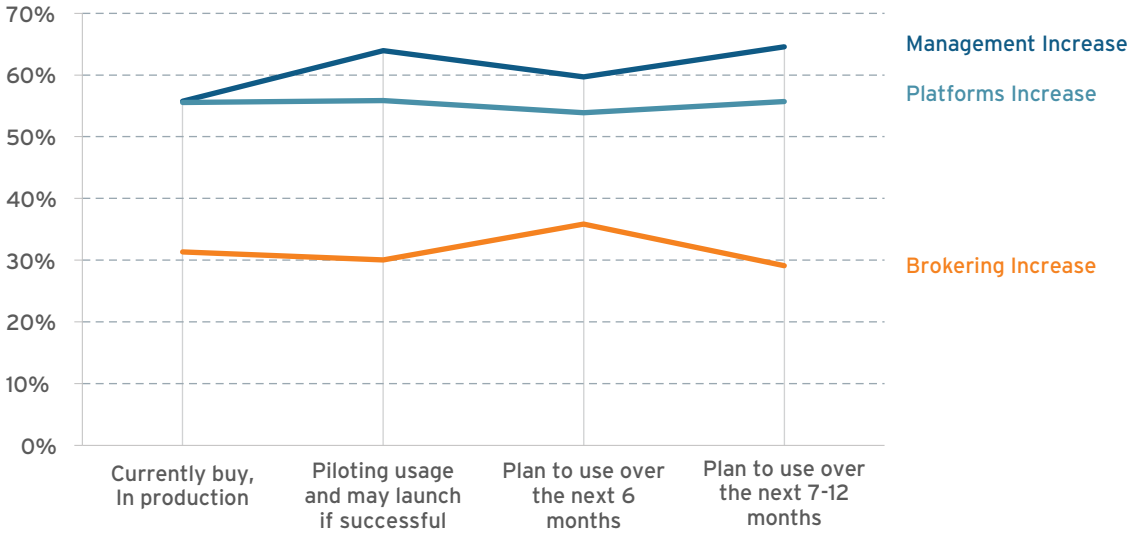


The directional nature of these changes is consistent across virtually all vertical markets sampled, but actual spending across verticals is uneven. Organizations in finance and banking, government, telecom, healthcare, retail and manufacturing are all spending the most heavily on CETs, and are therefore better poised for future cloud growth.

IV. BUILDING ON-RAMPS: THE FOUNDATION OF THE HYBRID CLOUD

Figure 5 shows the percentages of respondents who indicate they are increasing spending on specific cloud-enabling technologies juxtaposed against third-party private-cloud maturity. The findings reveal that a majority of enterprises will increase spending on management and platforms as they plan for and deploy a hosted private cloud. The technologies referenced in the figure (management, platforms and brokering) are essentially the building blocks of a hybrid cloud.

Figure 5: Cloud-Enabling Technologies Spending vs. Third-Party Private Cloud Maturity



Enterprises are signaling increased spending on the multi-cloud delivery platforms that will become ever more common. Many trusted and reputable vendors are developing tools and other components of this foundational work. These key hybrid cloud building blocks include management, platforms and brokers.

- **Management** – More than 60% of study respondents signal that they will increase investment in management software. Year-over-year spending spikes during pilot phases, when monitoring is crucial. Enhanced management capabilities drive more control and transparency into the hands of end users – and a lack thereof is often cited as a leading inhibitor of third-party cloud adoption. Users moving up the stack from first-tier virtualization implementation initially drive management software growth. As virtualized environments increase in scope, IT professionals are faced with a growing challenge to ensure environment functionality. Enterprises are deploying management tools across on-premises and third-party hosted public and private cloud environments. A number of recent events – public service outages, high-profile company failures and revelations of government surveillance – have increased the appetite for private, on-premises cloud implementations.
- **Platforms** – The percentage of respondents who indicate that they will increase spending on platforms peaked at 66%, with a plateau during the pilot phase. Specifically, this refers to software that provides prepackaged, cloud-ready platforms for commonly used server, application and storage configurations. This also includes containers that aid in application and workload portability, as well as OpenStack technologies.
- **Brokers** – The percentage of respondents who indicate that they will increase spending on brokering technology peaked at 36% during the six-month period before deployment to a third-party private cloud. Mixed-cloud environments will be required to interoperate, and brokers provide the software that facilitates the use of various cloud resources from one or more providers. Cloud brokers are owners and operators of a control plane, catalog or console that can automate scheduling, delivery and access to multiple cloud services.

These cloud-enabling technologies will serve as the glue that effectively binds on-premises and off-premises or hosted IT resources.

V. THE APPLICATION MOSAIC

As our research shows, IT departments will eventually deploy a number of applications across a plethora of on-premises and third-party-hosted infrastructure. Survey respondents indicated they currently use a number of service delivery models: 53% use outsourcing, 44% leverage public cloud, 38% use third-party private cloud, 53% use SaaS offerings, and 52% use traditional hosting and colocation.

Concerns related to security, compliance, cost and technical performance continue to influence the destination for a number of enterprise workloads. IT departments should conduct audits that aim to categorize workloads based on attributes that make them more or less suitable for cloud infrastructure deployment.

Most favorable characteristics leading to third-party cloud deployment:

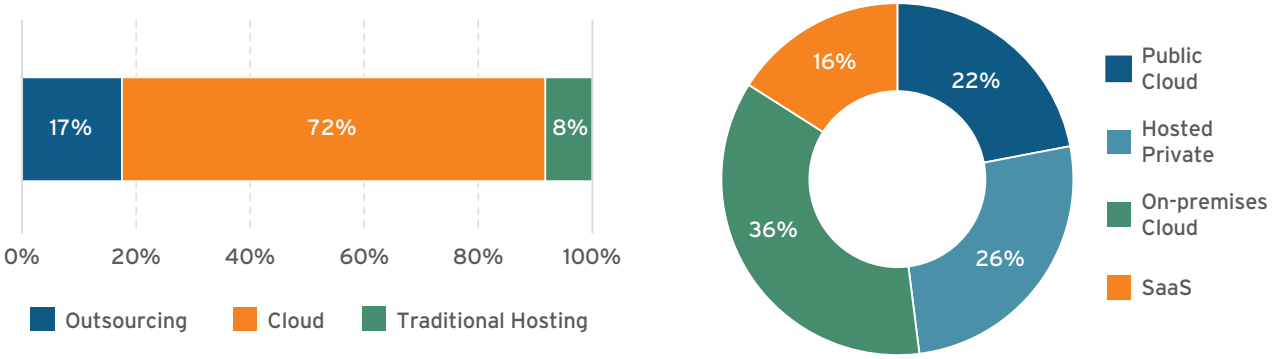
- Easily scales to a large number of users
- Connects to other data with apps or Web services
- Carries low organizational risk in the event of failure
- Can be accessed by significant numbers of mobile users

Least favorable characteristics leading to third-party cloud deployment:

- Has dependencies with on-premises apps
- Requires low network latency
- Requires tuning or customization

As indicated in Figure 6, nearly three-quarters (72%) of the organizations polled say cloud will become the primary application deployment method within two years. Of those workloads, 62% will be deployed to private clouds.

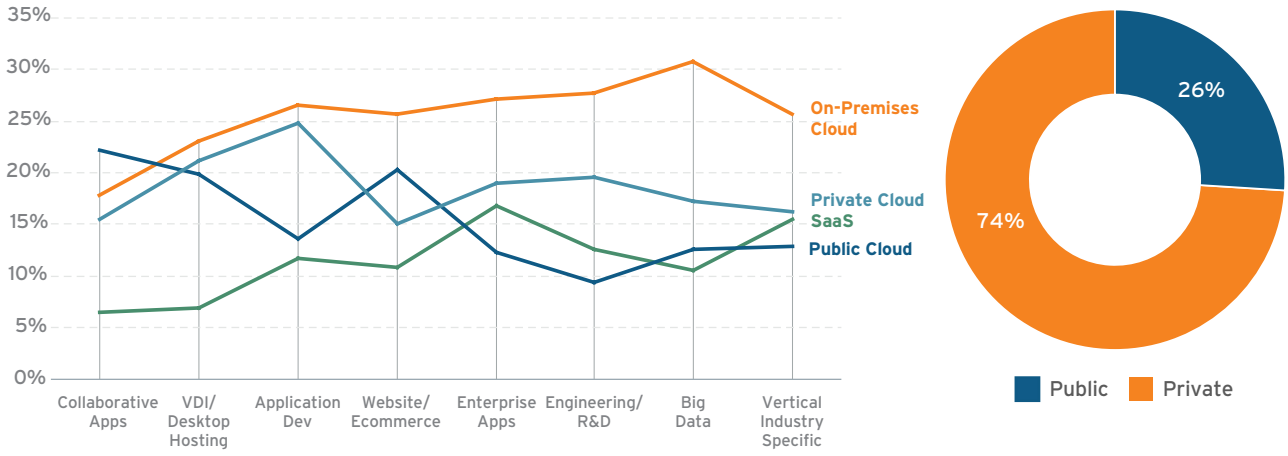
Figure 6: Primary Application Deployment Method (In 24 Months)



It is important to note that the bulk of cloud-deployed applications currently reside in private clouds, either on-premises or in third-party locations. Nearly every application analyzed in the study will likely remain on-premises over the next two years, according to respondents. Enterprises tend to choose private cloud for application development, enterprise applications, engineering, research and development, and big-data workloads. Public cloud is more popular for virtual desktop infrastructure, e-commerce and collaboration applications.

Figure 7: Workloads by Cloud Service Delivery Type

Private = Third-Party Hosted Private Cloud



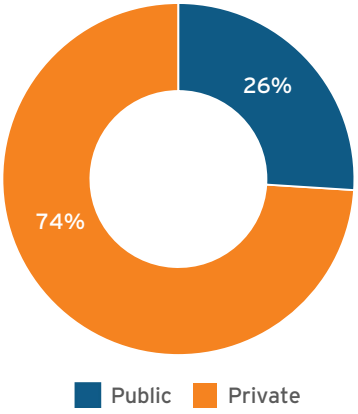
VI. THE RIGHT MIX OF PRIVATE AND PUBLIC CLOUD IAAS: A GUIDING PRINCIPLE

Like fingerprints and snowflakes, every organization is unique when it comes to cloud use and data. Each has specific preferences and requirements for more or less security and more or less privacy. Some are heavily regulated, with greater needs for auditing and compliance capabilities. These characteristics and requirements contribute to an enterprise's appetite for private and public cloud. The challenge becomes identifying the right mix.

The uniqueness of organizations notwithstanding, this 451 Research study revealed what the 'right mix' of private and public cloud resources might be for many enterprises over the next two years. This mix is an average of approximately 74% private and 26% public, with private cloud defined as both on-premises private cloud and third-party-hosted private cloud.

The application mosaic and drivers examined in the previous section contribute to evolving the cloud mix moving forward. There will also be differences in this mix from one vertical market to another, as shown in Figure 8. Today these differences are muted, primarily because the majority of workloads in the cloud are horizontal rather than vertical. There is a stronger preference for private over public clouds in the government and insurance/financial sectors, and this makes sense. These are among the most heavily regulated groups for which compliance is a way of life, more so than in many other verticals. By contrast, the less regulated telecommunications industry is shown to be the heaviest user of public cloud of the seven vertical markets examined.

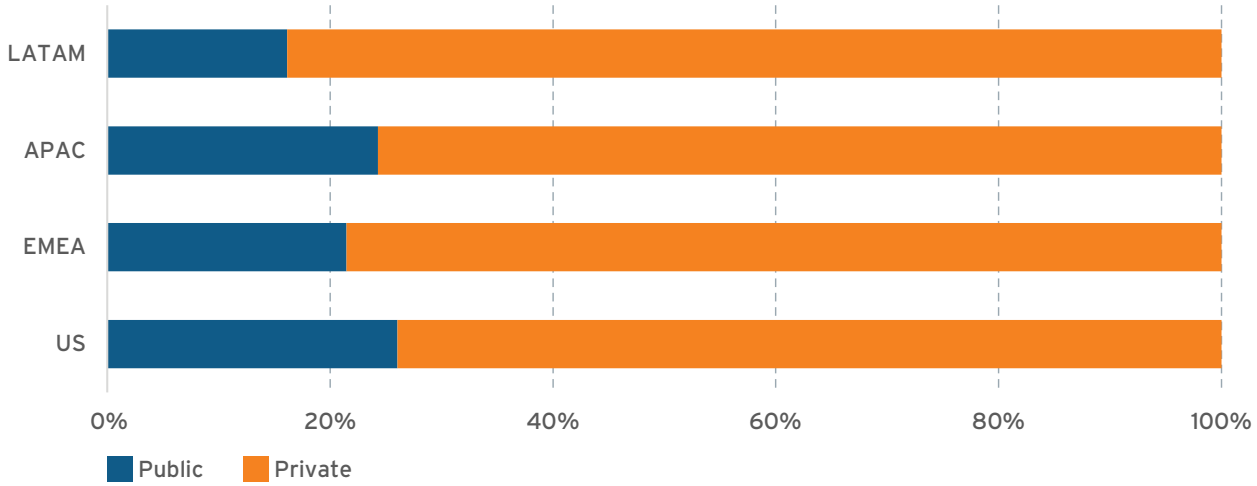
Figure 8: Right Mix by Vertical



VERTICAL	PRIVATE	PUBLIC
Insurance	81%	19%
Government	78%	22%
Manufacturing	77%	23%
Retail	73%	27%
Healthcare	72%	28%
Finance and Banking	71%	29%
Telecommunications	67%	33%

In addition to vertical market aberrations, the observed mix of private and public cloud is somewhat sensitive to geographical differences. In most European countries, privacy laws are more stringent than in the US, China or India. Use of public cloud is perceived as less secure than private cloud, and as a result private cloud is used less in Europe. The private/public cloud mix in the US is 75% to 25%, compared with 79% to 21% in Europe, the Middle East, and Africa (EMEA); 76% to 24% in the Asia-Pacific region, which includes China and India (APAC); and 85% to 15% in Latin America (LATAM).

Figure 9: Private vs. Public Cloud Mix by Geography



When considering the right mix of private and public cloud, it is important to bear in mind that this mix is as dynamic and changeable as the cloud and business environments in which organizations operate. This snapshot serves as a general benchmark of where typical organizations are today as this IT transformation unfolds.

In light of this research, it is not unreasonable for organizations to assess their current mix of private vs. public cloud balanced against their unique business needs. Finding the right mix is important given the substantial portion of IT budgets destined for cloud infrastructure. One best practice in doing this assessment is to work closely with existing third-party vendors, ensuring that they grasp the organization's unique needs and future directions. IT departments should seek a comprehensive menu of open and interoperable solutions among the clouds of their choosing, while also seeking simplicity through a single point of management. Third-party partners should also have the ability to help manage the transition of legacy equipment and workloads to new platforms.

A. SECURITY: A SPEED BUMP, NOT A BRICK WALL

When IT leaders are on the verge of fully embracing a potentially disruptive new paradigm, the route from A to B is never without some impediments. Results from our research indicated little correlation between companies that cited security as a concern and actual cloud usage – which suggests that security may be a paper tiger. Security concerns or hesitation in moving to the cloud at the lower levels of the IT organization are often being overridden by business priorities defined at the top. In fact, 61% of IT managers cite security as a leading inhibitor to cloud adoption, compared with just 48% of CEOs.

Part of the private/public cloud mix equation is determining appropriate security levels for different classes of data and deploying them accordingly. We expect that security will impact the mix of private vs. public cloud for security-conscious and compliance-sensitive applications. It's not surprising that government and financial institutions indicated the greatest concerns about cloud security given the relative intensity of compliance and regulations in those sectors. However, these security concerns altered the mix of private and public cloud just slightly. The overall mix was 74% private (includes on-premises and hosted private cloud) and 26% public. But when security is cited as a leading concern, the mix only shifts by a few percentage points, to 77% private and 23% public.

B. IT RESISTANCE

Lack of IT buy-in for cloud initiatives is statistically a lesser concern than other issues identified by study respondents. It is a disproportionately important one, however, since IT is usually designated as the principal internal broker of cloud services. This is a difficult issue for vendors to address through products and services, but their relationships with CIOs and other IT

influencers can work to their advantage in allaying these worries. The lesson learned the hard way for various organizations is that the transformation to cloud shouldn't be an iterative learning process for IT staff. Rather, it is more of a 'throw out everything you thought you knew and start over' journey.

VII. KEY INSIGHTS AND RECOMMENDATIONS

Security concerns aside, 451 Research believes that distinctions between public and private cloud will all but vanish over the next two years as service providers figure out how to scale private clouds to match the public cloud alternatives. The issue isn't where equipment is located or who manages it, but rather the existence of a seamless, virtualized and isolated infrastructure. The infrastructure may be single-tenant or multi-tenant; it won't matter as long as the enterprise's needs for security and data ownership are met. There remains plenty of work for vendor partners to do here, particularly in terms of helping organizations minimize risk in cloud deployments without inhibiting innovation and agility. There is plenty of work for internal IT departments as well, most notably in building out the cloud-enabling technologies that will support the secure cloud deployment of an increasing number of mission-critical applications.

As the next 24 months unfold, it is reasonable to expect that the mix of private and public cloud will change. If enterprises perceive fewer distinctions between the various flavors of cloud delivery spending will increasingly shift from public to private. We recommend that organizations look carefully at incumbent enterprise-ready service providers, whose long-term relationships with these organizations will serve them well as they parse the most appropriate deployment decisions.

We also recommend keeping an eye on the emerging cloud broker market. These critical vendors will act as intermediaries between organizations and their multiple cloud providers, with the goal of providing seamless data interoperability among them. While this discipline is still evolving, our research indicates that cloud brokers could become important new factors in enterprise cloud decision-making and may significantly influence the industry's development. Brokers may potentially disintermediate industry leaders and commoditize certain segments of the IaaS market in particular.

GLOSSARY

Outsourcing services: Typically an outsourcer or systems integrator that takes over an entire IT business function for your organization, including supplying IT systems, applications and staff. Contracts are typically multiyear commitments.

Third-party public cloud services: Server, storage or network capacity that is owned and managed by a hosting provider, outsourcer or other third party. These service offerings may include virtualization software, operating systems and management tools, as well as the hardware. Server resources are shared.

Third-party private cloud services: Server, storage or network capacity that is owned and managed by a hosting provider, outsourcer or other third party. These service offerings may include virtualization software, operating systems and management tools, as well as the hardware. Server resources are dedicated to the client and are not shared.

Software as a service (SaaS): A finished application offering, where the provider manages all aspects of the application, including security, availability, performance, development and maintenance.

Platform as a service (PaaS): A set of tools, libraries and services configured as a solution for application development and deployment. PaaS typically spans the entire application development lifecycle, including coding, testing, deployment, runtime, hosting and delivery.

Traditional hosting and colocation services: Leased rack space and network connectivity to house your own IT systems and software. The customer typically conducts maintenance of systems and applications.

ON-PREMISES PRIVATE CLOUD DEFINITIONS

Management: Management, self-service, service catalogs, monitoring, configuration, orchestration and automation software for a virtual or cloud infrastructure and the applications that run on top of it.

Platform: Software that provides prepackaged, cloud-ready platforms for commonly used server, application and storage configurations. This also includes containers that aid in application and workload portability, as well as OpenStack technologies.

Brokering: Software that facilitates the use of cloud resources from one or more providers. Cloud brokers are owners and operators of a control plane, catalog or console that can automate scheduling, delivery and access to multiple cloud services. Cloud-broker-enabling technologies enable service providers or enterprises using an ITaaS (IT as a service) model to operate as cloud brokers using tools for multi-cloud migration, procurement, management and billing.

Server virtualization: The first layer of virtualization. Includes hypervisor, containers and administration tools that form the basis of any virtualized infrastructure.

Virtualization (data and application protection): Capabilities for virtualized IT environments that include fault tolerance, backup, disaster recovery, high availability and business continuity.

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