



## WHITE PAPER

# Journey to the Hybrid Cloud

Sponsored by: VMware

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## HYBRID CLOUD: ENABLING DIVERSIFIED IT ENVIRONMENTS

Cloud adoption has now entered the "early mainstream" stage as enterprises increasingly look to cloud deployment as a viable model for agile, cost-effective IT delivery. However, the prevailing binary paradigm of cloud infrastructure (public versus private) limits the extent to which enterprises can fully leverage the on-demand, self-service, elastic resource provisioning attributes of public cloud while maintaining the same security, reliability, performance, and management frameworks present in current private cloud implementations. Hybrid cloud solves this problem.

In simple terms, hybrid cloud enables a converged or diversified IT environment encompassing both public/offsite and private/onsite cloud resources. Virtual machines, applications, and workloads operate seamlessly across different types of IT environments – private clouds residing in enterprise datacenters, private clouds located in service provider datacenters, and external public clouds. However, hybrid cloud is more than just the middle ground between public cloud and private cloud and involves more than simply running different workloads in different IT environments. Hybrid clouds integrate compute, storage, security, networking, applications, and management into a common, highly orchestrated onsite/offsite IT operations "workspace," which enables enterprise IT and developers to leverage the speed and agility of public cloud in concert with the existing tools, systems, and policies being used in the enterprise datacenter.

### Cloud Deployment Taxonomy

- **Public cloud services** are shared among unrelated enterprises and consumers, open to a largely unrestricted universe of potential users, and designed for a market, not a single enterprise.
- **Private cloud services** are shared within a single enterprise or an extended enterprise, with restrictions on access and level of resource dedication, and are defined/controlled by the enterprise, featuring a level of control beyond what is available in public cloud offerings. Private clouds can be *onsite* or *offsite* and can be managed by a *third party* or by *in-house staff*.
- **Hybrid cloud** is a unified, orchestrated management framework for different IT cloud deployment models (onsite private cloud, dedicated hosted/offsite private cloud, and/or public cloud).

Ideally, legacy applications built on traditional client/server IT architecture, contained within virtual machines, and operating in an enterprise datacenter can run unchanged in a federated public-private cloud environment provided that the onsite hypervisor is consistent with the virtualization environment in the public cloud. In the IT context, hybrid clouds bring the "outside in" and let the "inside out."

As cloud adoption and usage become increasingly mainstream, implementation approaches will be more solution and application driven. Therefore, "cloud" can no longer be viewed as a standalone IT sourcing and consumption model. The industry is offering an expanding variety of cloud deployment options – allowing a wide range of customers to "have cloud their way." The biggest long-term requirement for this ideal state is a seamless application, data, and management environment across in-house IT and "outside" resources. This situation is a precondition for accelerating the enterprise journey to the cloud and unlocking the benefits of cloud computing, such as flexibility and scalability, while mitigating the impact of inhibitors, chief among them being interoperability concerns and the need for application and workload portability.

## CLOUD ADOPTION AND IMPLEMENTATION: HYBRID CLOUD ON THE MOVE

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According to IDC's 2014 *CloudView Survey*, currently, 37% of enterprise IT expenditure is allocated to externally provided cloud infrastructure services. Private clouds in onsite and third-party hosted environments have already reached budget share parity with traditional IT and will account for nearly one-third of total IT budget allocation in the next two years, highlighting continuing transformation in the enterprise datacenter and the immediate appeal of dedicated cloud environments (see Figure 1).

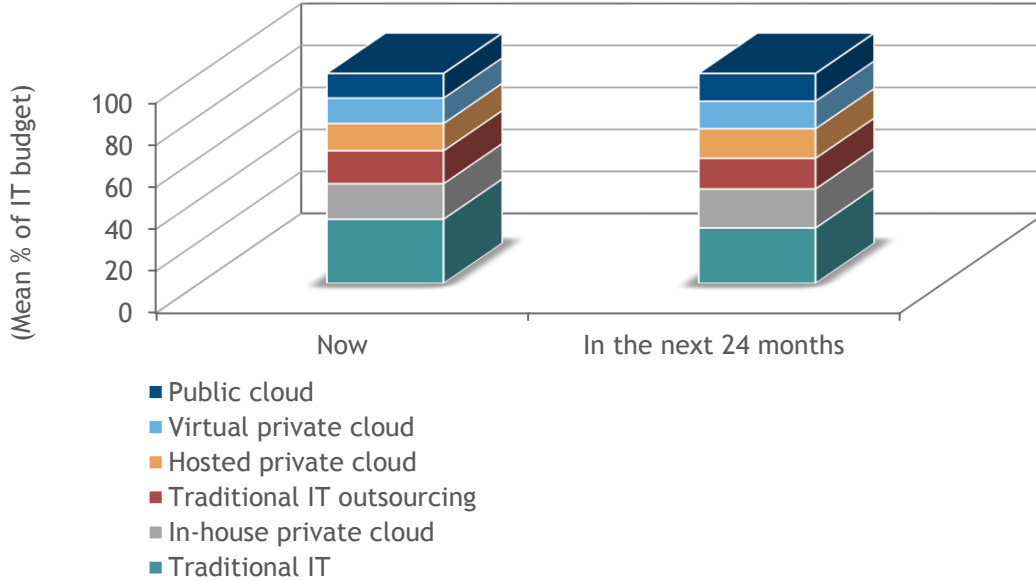
Private cloud is the primary type of cloud infrastructure currently in use by the organizations IDC surveyed, but the use of multiple cloud deployment models indicates substantial implementation of the hybrid approach. IDC polled organizations about their current understanding of hybrid cloud and adoption of hybrid cloud strategies (see Figure 2). The prevailing view of a majority of respondents positions hybrid cloud as being an orchestrated environment made up of diverse cloud infrastructures. When it comes to implementation, however, the "multicloud" approach is the most commonly adopted current hybrid cloud implementation strategy.

Enterprises clearly recognize the benefits of cloud, and, as shown in Figure 3, these benefits fall into a range of domains, including improved IT staff productivity and resource utilization and allocation, operational efficiency, cost reduction, and improved overall business agility. Simplification/standardization of IT/application platforms remains an important public cloud driver. In addition, 76% of IDC's *CloudView Survey* respondents indicated "strong agreement" or "agreement" with the notion that they expected to be able to migrate applications and data from their onsite datacenter to a public cloud and/or migrate among multiple cloud providers, depending on business and IT requirements. These results highlight the importance of workload migration across cloud deployment models and indicate substantial interest in hybrid cloud implementation.

**FIGURE 1**

**IT Budgets by Management/Deployment Model**

Q. Estimate how much of your company's IT budget will be allocated to each of these IT management/deployment models.



n = 800 U.S. respondents

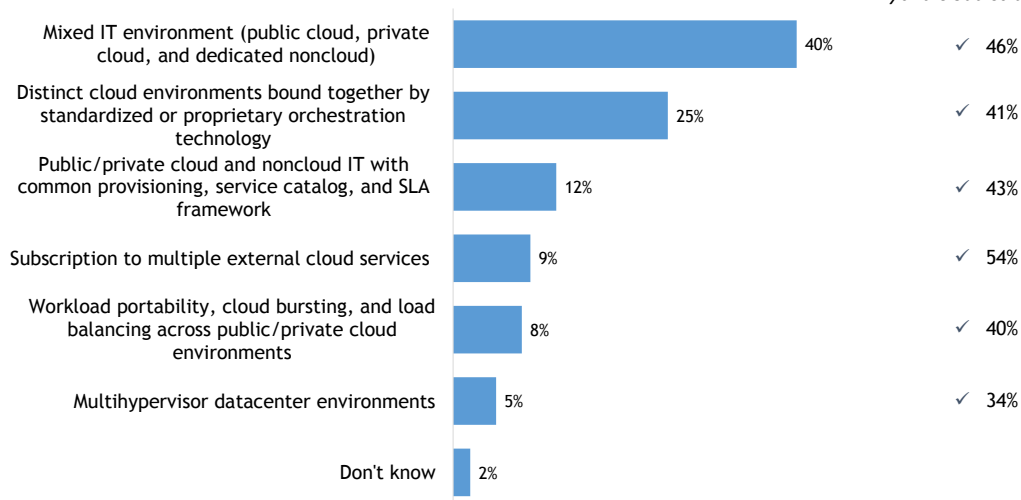
Source: IDC's *CloudView Survey*, December 2014

**FIGURE 2**

**Hybrid Cloud Understanding and Implementation**

Q. Which of the following descriptions comes closest to what you think of as a "hybrid cloud?"

Q. Under which of the following definitions of "hybrid cloud" has your organization adopted a hybrid cloud strategy?



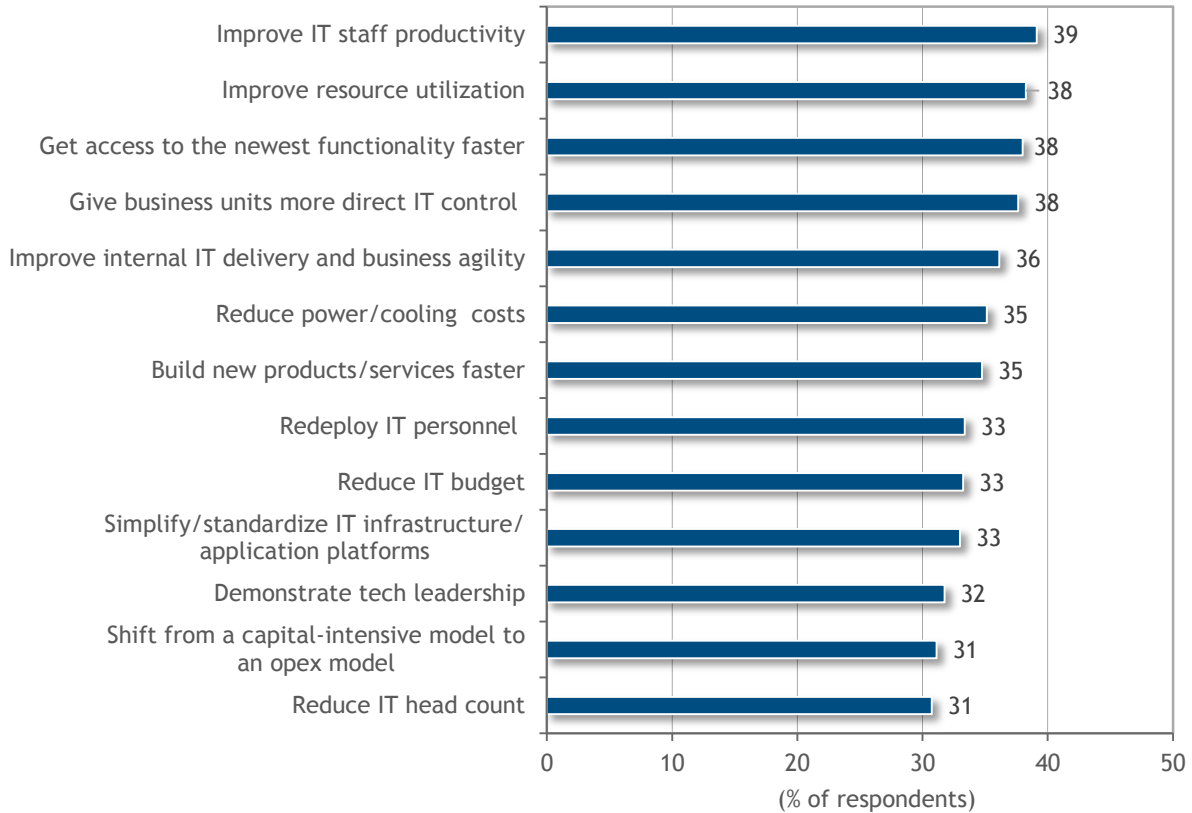
n = 800 U.S. respondents

Source: IDC's *CloudView Survey*, December 2014

**FIGURE 3**

**Public Cloud Drivers**

Q. *Of the following potential reasons for moving to cloud, which are considered "important drivers" that you expect to achieve when moving to cloud? Select all that apply.*



n = 800 U.S. respondents

Source: IDC's *CloudView Survey*, December 2014

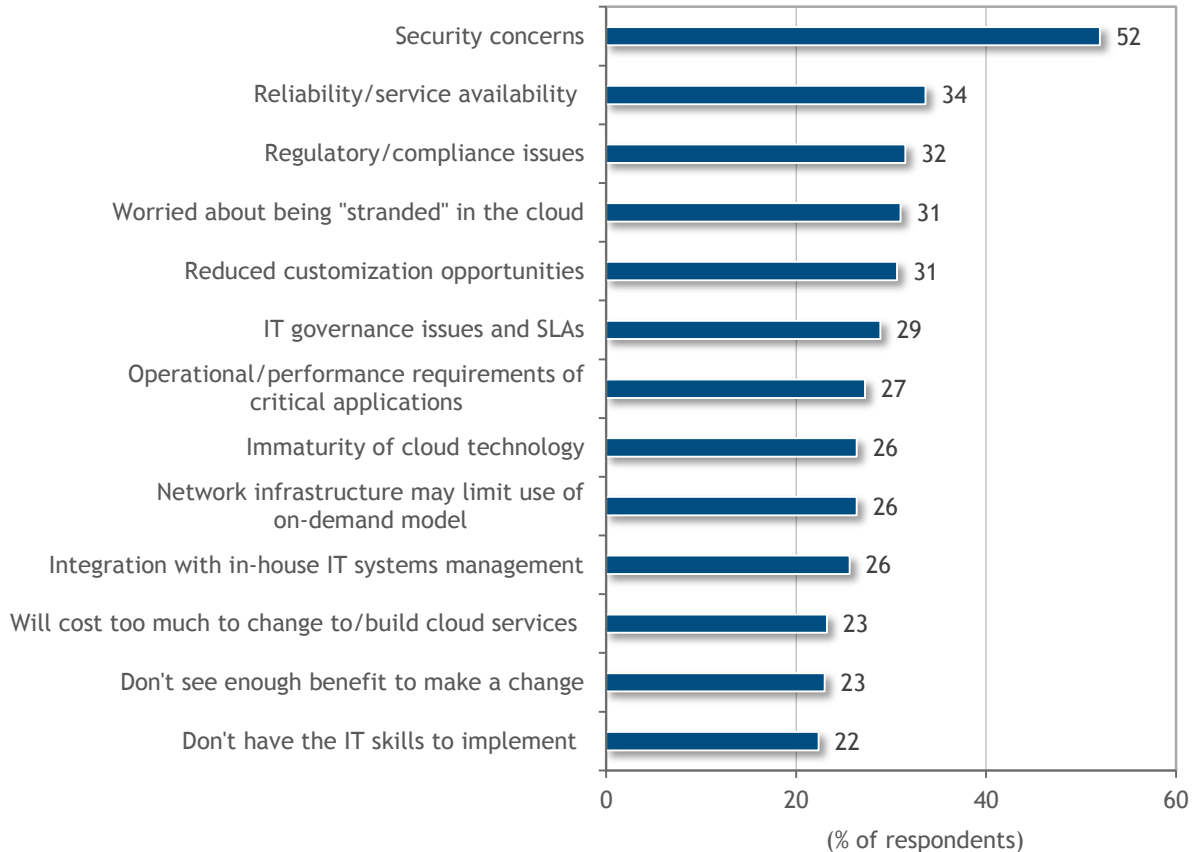
Public cloud is increasingly becoming part of the enterprise IT mix, but organizations continue to weigh the cost and agility advantages of public cloud against an array of concerns (see Figure 4). The primary barrier to the adoption and increased usage of public cloud services is security. Typically, an organization's concerns about security are multifaceted, touching data security, regulatory compliance, external threats to the service provider's cloud infrastructure and datacenter environments, shadow/rogue IT usage, and issues related to the lack of visibility into the cloud service provider's infrastructure. Other challenges are operational in nature, related to concerns about service reliability and availability, application/workload performance, "lock-in," and customization. Interoperability and workload portability, which had been top concerns in the past, are gradually being eclipsed by day-to-day usage issues as organizations move beyond mere adoption and proof-of-concept implementations and leverage public cloud infrastructure services to support production applications and workloads. However, IDC believes that security will continue to be a top concern for cloud migration/usage as organizations move increasingly complex and/or business-critical applications to the cloud. Therefore, interoperability and

standardization between external and internal cloud environments represent the table stakes for application portability and serve as the foundation for the types of diversified IT environments that ease an organization's transition to the cloud.

**FIGURE 4**

**Public Cloud Inhibitors**

Q. Which of the following best describe your organization's main concerns about cloud and are "important inhibitors" for your organization in considering cloud services? Select all that apply.



n = 800 U.S. respondents

Source: IDC's *CloudView Survey*, December 2014

Currently, private cloud is the predominant go-to deployment option, but organizations also want to tap into the financial savings and operational agility that come with public cloud. The wall between public cloud and private cloud is coming down as automation and orchestration management technologies enable IT architects to consider their enterprise datacenters, corporate VPNs, and external cloud-based resources as a unified IT resource environment. Tearing down this wall means enhanced flexibility for IT organizations to provide on-demand compute and storage resources to support the increasingly rapid delivery timelines of developers and line-of-business users. Hybrid cloud can also help transform the organizational dynamics of enterprise IT and line-of-business/developers by

elevating IT operations to the more strategic role of optimizing end-user access to the internal and external IT resources that are needed for the business. As a result, IT can serve as a business enabler in the evolution toward more agile cloud-based IT.

Hybrid cloud implementations facilitate a number of new capabilities and provide important business benefits, including the following:

- **Continued leverage of existing IT systems investments.** Born-on-the-cloud companies can take direct advantage of the flexibility and agility that public cloud technology enables, but enterprises run largely on traditional IT architectures, which makes the broad embrace of cloud more difficult. Investments in equipment, software, trained personnel, and datacenter facilities cannot simply be written off in favor of "asset light" public cloud services. Hybrid cloud incorporates outside resources into internal IT environments, augmenting what's already in the enterprise datacenter with self-service "stretch" capacity. The ability to bring the outside in means that organizations can delay or even forgo additional datacenter capex in favor of an opex approach.
- **Centralized governance, decentralized infrastructure.** The benefits of public cloud are undeniable: on-demand resources, elastic scaling, consumption-based pricing, and self-service provisioning. However, these characteristics can also create "rogue IT" purchasing and deployment situations, resulting in fragmented enterprise IT environments and operational complexity as well as security and compliance risks. Hybrid clouds that tightly link the enterprise datacenter with public cloud resources – along with well-defined access and usage policies and processes – ensure consistent IT governance while enabling location-agnostic flexibility.
- **The right environment for the right workload at the right time.** Hybrid architectures allow organizations to place workloads in appropriate environments based on factors such as data criticality, compliance mandates, application behavior characteristics, usage patterns, and security/performance requirements. Standalone public clouds generally mean a one-size-fits-all approach for each workload, regardless of the individual application profile considerations. Hybrid cloud enables a common IT architecture for both legacy and net-new cloud-native applications. The ability to mix and match deployment environments based on workload-specific performance, security, and compliance parameters and the flexibility to support both scale-up and scale-out needs mean that all of an organization's applications can exist in a unified IT environment. Workloads can move between private clouds residing in internal datacenters and the public cloud (and vice versa) based on life-cycle timing considerations (e.g., testing/development in the public cloud and production in the onsite private cloud), disaster recovery and business continuity planning, and burst capacity requirements. Hybrid cloud also supports composite application scenarios in which back-end systems of record elements such as databases containing sensitive company or customer information remain in the onsite private cloud environment while the Web front end and systems of engagement components live in a public cloud to take advantage of rapid scale-up/scale-out capabilities and closer proximity to end users via network interconnection and peering. Bonding or federation between private and public clouds via seamless networking creates a common, orchestrated IT operations workspace with security configuration and policy portability and statefulness within and between cloud deployment environments.
- **Bridging the divide between IT and line of business.** Hybrid cloud helps give each group what it wants: security, visibility, and manageability for the IT organization and speed, agility, and elasticity for the developers and line-of-business IT users. To the extent that the IT organization can incorporate external public cloud services into formalized IT procurement, management, and governance processes, IT becomes a facilitator of – rather than a roadblock to – more dynamic, business-ready IT.

## NOT ALL HYBRID CLOUD SOLUTIONS ARE CREATED EQUAL

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### The Hybrid Cloud Service Provider Landscape

The hybrid cloud services market is still maturing, but a broad array of providers from different sectors of the IT industry have converged around the opportunity. The various participants take different approaches to the hybrid cloud space, building upon their existing datacenter and infrastructure assets, technology development skills, integration and management expertise, support capabilities, and customer relationships. The competitive hybrid cloud service provider landscape includes IT outsourcers and systems integrators, telecom carriers and other network service providers, hosting specialists, hardware vendors, software companies, and cloud-native infrastructure-as-a-service (IaaS) providers.

Providers with roots in "legacy" (i.e., noncloud) IT services businesses often take inelegant, improvised approaches to the hybrid cloud challenge and interconnect customers' onsite private cloud infrastructure to public clouds (their own services or those of other providers) in ways that may not be optimized for seamless operations. Typically, this is achieved via over-the-top management platforms or stacked software and VPN networking. However, there's more to hybrid cloud than connecting an onsite datacenter to a public cloud and moving workloads between them. Internal and external clouds must be orchestrated to work together as a single system, and workloads should be able to run in the public cloud domain without drastic rewrites of the application code or radical redesigns of the deployment environment, including network architecture, security policies, business logic, and high availability and disaster recovery configurations.

In response to enterprises' interest in diversified IT environments, providers in the hyperscale standalone public cloud services market are now offering variations on the pure public approach through dedicated infrastructure options, SSL or IPSec VPNs to enable private networking to the public cloud, and "multicloud" offerings developed in partnership with service providers that offer hosted private cloud solutions. However, the same compatibility and interoperability issues come into play with such hybrid solutions because the public and private components feature different architectures, toolsets, management frameworks, and service catalogs. Disparities among these elements must be abstracted away just to ensure proper migration – not to mention the creation of seamless "inside" and "outside" application development and production environments.

### Hybrid Cloud Solutions: Key Considerations

Hybrid cloud solutions offer organizations all the benefits of public cloud without the associated trade-offs. Flexible, dynamic IT is the future, but looking forward also means reaching back (i.e., taking stock of existing IT investments, workloads, and processes and determining how to best federate them with agile and scalable external IT resources). Ultimately, cloud is about more than just cutting-edge technology and the pay-as-you-go usage model. The true significance of cloud (especially in its hybrid incarnation) is the opportunity it offers to traditional enterprise IT shops to transform not only the corporate technology environment but also the role of IT within the organization.

When evaluating hybrid cloud solutions, enterprises should keep in mind certain technology and organizational considerations, including the following:

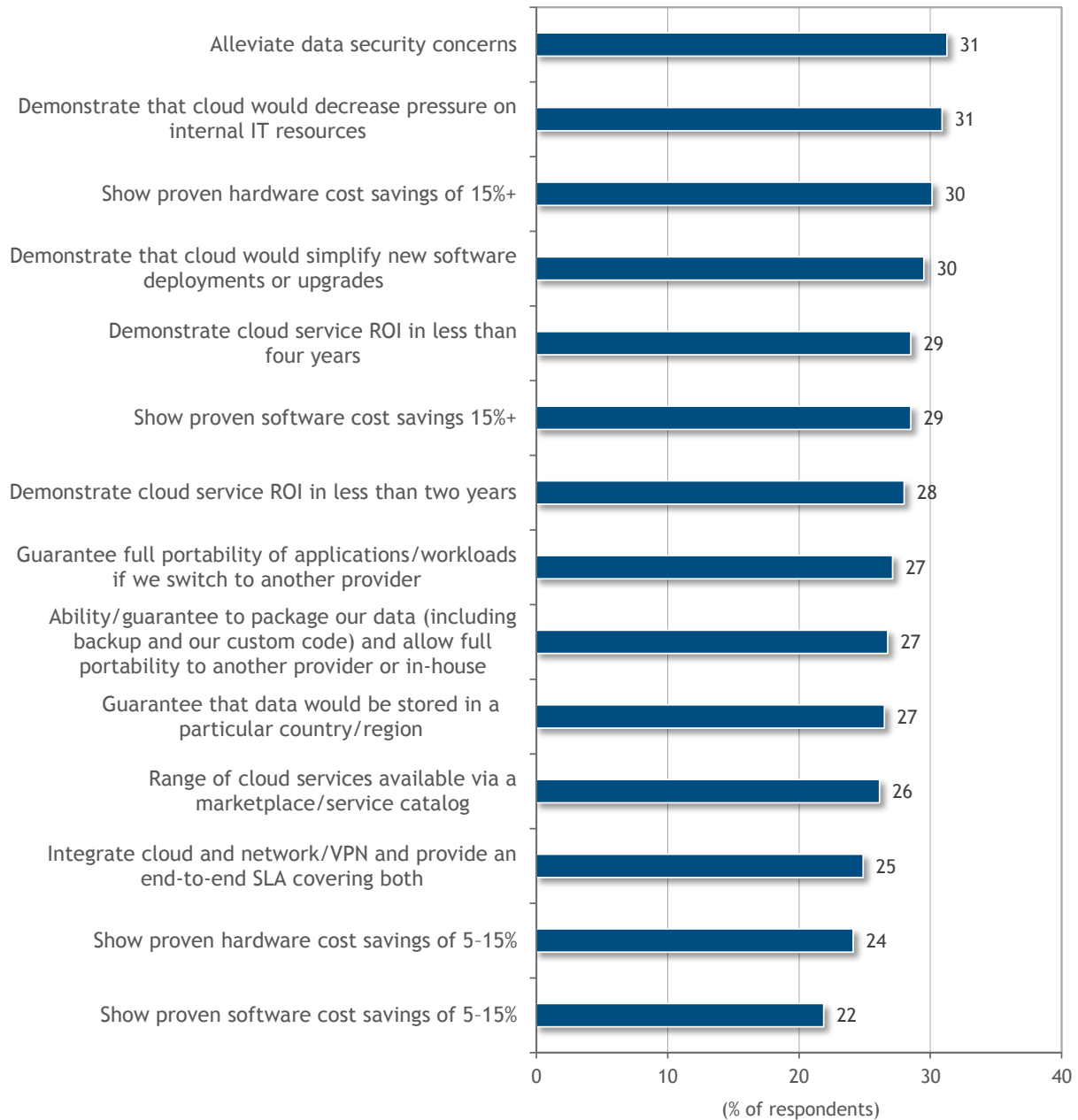
- **Organizational dynamics.** Who are the various IT constituencies in the enterprise, and how are their current needs being met (or not) with the existing IT environment? The various IT stakeholders – IT buyers, decision makers, administrators, and end users (i.e., application developers and line-of-business managers) – may take different paths to cloud. Transformation-oriented IT leaders can leverage hybrid cloud to position themselves as enterprise IT architects who ensure that resources are centralized, stable, and secure but dynamically available to serve both IT operations and IT-driven business requirements.
- **Workload placement.** Which applications are best suited for onsite private clouds, which can benefit most from operating in offsite public cloud environments, and which are ideally positioned to move between environments as needed based on load, scalability, cost optimization, application life-cycle, and end-user experience/proximity requirements? The decision-making process plays out across multiple vectors, encompassing the security, performance, and compliance requirements of individual application, workload, and business process components.
- **Hybrid cloud use cases.** What IT workloads will hybrid cloud be used to enable? The offsite dimension of hybrid cloud can support peak load resource bursting for production environments, scalable sandboxes for software testing and development, and disaster recovery/remote storage scenarios. Hybrid cloud can also support the broader objective of location-agnostic IT where workloads simply run in the appropriate environment – onsite or offsite, with business, application life-cycle, scale-up/scale-out requirements, and other factors determining what runs where. The hybrid cloud model can be used to support self-service-enabled rapid resource provisioning for line-of-business managers and application developers who need fast access to IT resources but also need to leverage applications and IT operations management tools residing on the other side of the corporate firewall. Similarly, mission-critical workloads can leverage hybrid clouds to support optimized distributed environments for geographically dispersed customers, business partners, or end users. Cloud-aware, scale-out mobile, data/analytics, and Internet of Things (IoT) applications and variable-load Web-serving/compute processing tiers can live in the public cloud to take advantage of the inherent elastic capacity, while fixed/predictable load functions and/or more location-sensitive application or data store tiers can stay in the onsite datacenter.
- **Service provider selection.** When making the decision about a hybrid cloud solution partner, organizations should consider whether the offering is fully integrated with enterprise IT or just loosely connected raw compute and storage capacity delivered to end users in the organization. Furthermore, enterprises with an interest in true federation of their onsite and offsite IT environments should make sure that the provider's hybrid cloud solution supports application/workload portability; provides a common architecture across all domains (infrastructure, management, security, monitoring/reporting, metering, and networking); and serves as a seamless extension of the enterprise datacenter by managing internal and external resources as a unified pool of available IT capacity. Other selection factors to take into account include service-level agreements, datacenter redundancy, the catalog of applications and related services (both legacy and cloud-native) certified to run on the platform, and the partner ecosystem available to serve customers' redesign, implementation, migration, and operational support requirements. The relative importance of the cloud acceleration factors presented in Figure 5 provides insight into key service provider evaluation considerations.



**FIGURE 5**

**Public Cloud Adoption Accelerators**

Q. Which of the following factors would accelerate your organization's adoption of public cloud services? Select all that apply.



n = 800 U.S. respondents

Source: IDC's *CloudView Survey*, December 2014

## ENABLING THE HYBRID CLOUD WITH VMWARE VCLLOUD® AIR™

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Crossing the chasm between the internal datacenter environment and the offsite public cloud services world can be a challenge for many IT organizations. Public cloud is becoming an extension of IT environments as line-of-business managers, application developers, and IT leaders seek enhanced IT velocity, scalability, and efficiency. At the same time, the bulk of enterprise IT still lives behind the corporate firewall. Faced with this reality, IT leaders need solution partners that can support and also transform the current IT environment with hybrid cloud services that seamlessly extend existing datacenters into the cloud with end-to-end interoperability, performance, control, and visibility.

VMware is an example of this type of partner, and the vCloud Air cloud offering, operated and managed by VMware, provides an integrated solution for onsite and offsite IT resource provisioning, management, migration, and usage. Based on VMware's software-defined datacenter technologies, including VMware vSphere®, vCloud Air is VMware customers' path to the public cloud, leveraging the management framework and tools they already have in place to support onsite applications and workloads. Built on trusted, time-tested enterprise-grade technology, vCloud Air enables the seamless "inside out" datacenter extension needed to run and manage both legacy and new cloud workloads onsite or in the cloud without recoding the application or rearchitecting the internal IT environment. vCloud Air also supports "outside in" cloud-native applications that need to be repatriated to the enterprise datacenter or workloads that connect back into internally hosted systems. While it is not impossible to achieve hybrid cloud integration with different platforms on either side, it is costly and time consuming, forcing IT personnel to focus on rework and redesign rather than performance management, application development, IT transformation, and other more strategic tasks.

vCloud Air also takes networking – the core enabler of hybrid cloud – to the next level with Advanced Networking Services powered by VMware NSX™ network virtualization technology into the public cloud. Key features of vCloud Air include dynamic routing, enhanced VPN and distributed firewall capabilities, built-in load balancing, granular and stateful network security, and expanded virtual networking capabilities to support complex multitier network configurations.

VMware also brings a broad ecosystem of partners to its public cloud value proposition. This ecosystem includes technology, consulting, and integration partners as well as the VMware vCloud Air Network of nearly 4,000 service provider partners that offer a range of complementary management, applications, and options for vCloud Air deployments. More than 5,000 applications, 90+ operating systems, and infrastructure software tools have been optimized and certified for VMware environments, ensuring compatibility and convergence with existing IT investments. These capabilities are available via the vCloud Air service catalog or the vCloud Air Marketplace.

vCloud Air supports virtual private cloud and dedicated cloud deployments. The service offerings come packaged with built-in redundancy, high availability, firewalls, load balancers, IPsec VPNs, NAT, DHCP, and disk I/O at no additional charge. Customers can leverage the vCloud Air user interface or vSphere Web Client vCloud Air Plugin to manage their hybrid cloud environments.

VMware vCloud Air Disaster Recovery, built on VMware vSphere® Replication™ is another key offering in the vCloud Air service portfolio. The disaster recovery service provides a flexible and dependable failover, failback, and recovery environment in the event of operational disruptions. Asynchronous replication at the hypervisor layer facilitates simplified configuration of virtual machines in vSphere for disaster recovery, eliminating the need for changes to the existing virtualization environment. Additional features of this

offerings include native failback support and bidirectional replication between internal and vCloud Air environments, as well as multiple point-in-time recovery options and recovery plan automation.

The current vCloud Air global footprint includes datacenters in the United States, the United Kingdom, Japan, Australia, and Germany.

## THE FUTURE OF IT: DIVERSIFIED HYBRID CLOUD ENVIRONMENTS

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Adoption of cloud-based IT is not an either-or proposition. Hybrid cloud offers enterprises a broader range of choices and additional options for cloud deployment and operations. While some organizations will go all-in on public cloud (particularly small businesses and born-in-the-cloud SaaS providers and consumer-focused companies such as Netflix), enterprises with precloud business models will rationalize and automate their internal IT estates via using private cloud and leverage public cloud IaaS for certain internal applications and workloads and for customer-facing operations. Hybrid cloud may well be the IT end state for organizations that seek a balance between public cloud flexibility and centralized (or localized) IT control, while others may shift more and more of their IT to public clouds as legacy applications and datacenter systems reach the end of their life cycles and as agile application development approaches take hold within the enterprise. In any case, hybrid cloud offers a way to satisfy the resource requirements of line-of-business managers, application developers, and IT operations personnel, with on-demand access, self-service rapid provisioning, and scalability combined with the need to maintain a secure, reliable, policy-driven IT infrastructure.

However, not all hybrid cloud service providers are created equal. IT buyers should look for solution partners that can facilitate a seamless transition to the hybrid cloud world by bringing the outside in. Extending the reach of existing datacenters to the cloud with minimal impact on current operations, tools, and applications is the right approach to enterprise-oriented cloud. The journey to the cloud should not force organizations to rewrite their applications, redesign their IT architectures, and abandon their existing management tools. Interoperable hybrid cloud services provide the most cost-efficient, most operationally efficient, and least disruptive path to the cloud for enterprises seeking a fast track to business-driven dynamic IT environments.

*Note: All numbers in this document may not be exact due to rounding.*

## About IDC

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