



WHITE PAPER

Journey to the Hybrid Cloud

Sponsored by: VMware

Melanie Posey
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THE HYBRID CLOUD DEFINED

Cloud adoption continues to expand beyond the base of cutting-edge early adopters and is now reaching the "early mainstream" stage, increasingly being looked at by enterprises 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 is a unified 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 clouds are more than just a blend of public cloud and private cloud. 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 the consolidated coordination/management of multiple cloud services (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."

In the next phase of cloud adoption ("the mainstreaming years"), implementation approaches will be more solution and application driven, meaning that "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 the inhibitors, chief among these being interoperability concerns and the need for application and workload portability.

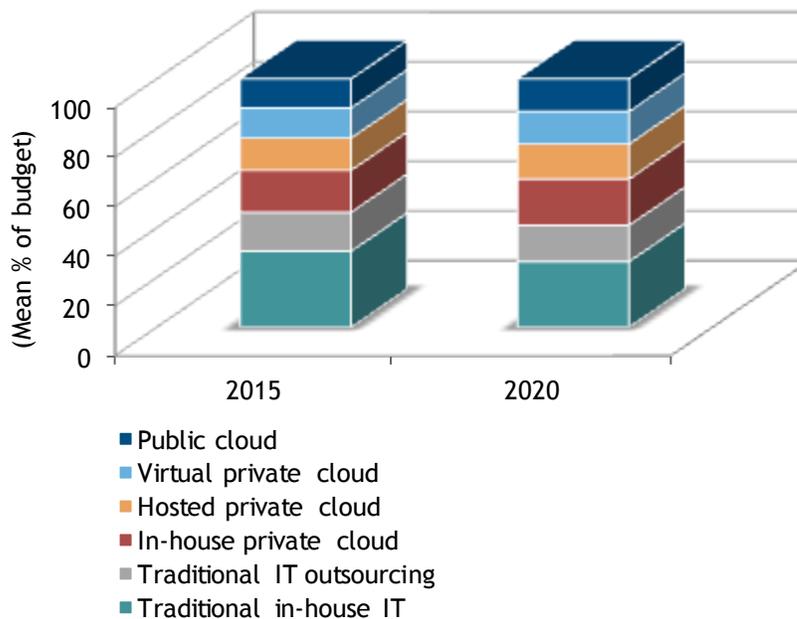
CLOUD ADOPTION AND IMPLEMENTATION: HYBRID CLOUD ON THE MOVE

According to IDC's *2013 CloudTrack Survey*, 54% of 2015 enterprise IT expenditure will be allocated to externally provided cloud infrastructure services. Private clouds (internal and third-party hosted environments) will reach budget share parity with traditional in-house IT in 2015 and surpass it by 2020, pointing to continued transformation in the enterprise datacenter and the immediate appeal of dedicated (and in-house) cloud environments (see Figure 1).

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 = 736 U.S. respondents

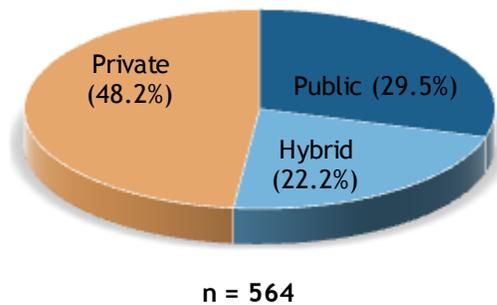
Source: IDC's *CloudTrack Survey*, 2013

Private cloud is the primary type of cloud infrastructure currently in use by the businesses surveyed by IDC, but hybrid cloud represents a healthy 22% of current cloud usage (see Figure 2). In the next few years, IDC expects that "pure" public or private cloud models will account for diminishing percentages of aggregate cloud usage as enterprises adopt the hybrid cloud deployment model for increasingly mission-critical workloads.

FIGURE 2

Cloud/IaaS Usage by Deployment Type

Q. Please allocate your cloud computing/IaaS usage among the following.



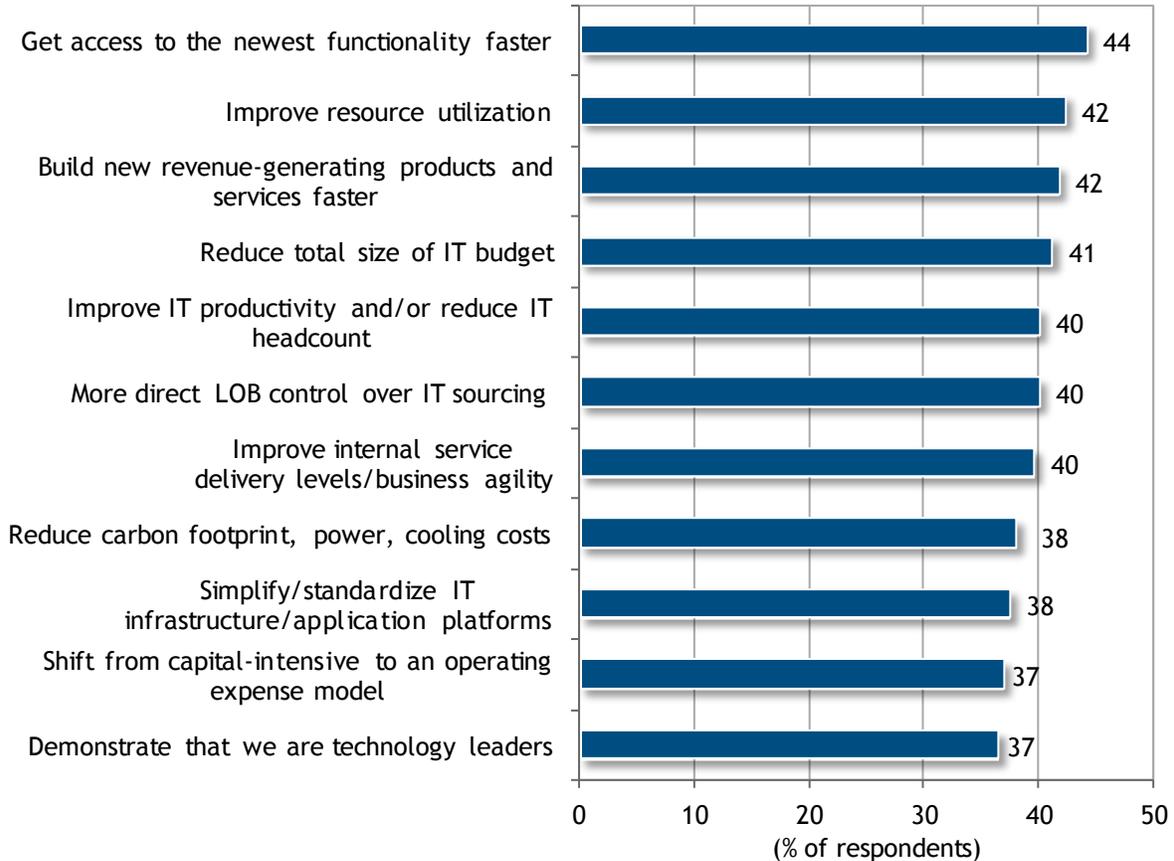
Source: IDC's *U.S. Enterprise Communications Survey*, 2014

Enterprises clearly recognize the benefits of cloud. As shown in Figure 3, access to new functionality, improved resource utilization, enhanced speed to market, and cost efficiency top the list of key public cloud drivers. Standardization of IT/application platforms also emerged as an important cloud consideration. IDC did not include this item in the most recent *CloudTrack Survey*; the previous year's results showed that more than half of respondents cited flexible workload migration between private and public clouds as a critical cloud attribute, indicating substantial interest in hybrid deployment models.

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 = 704 U.S. respondents

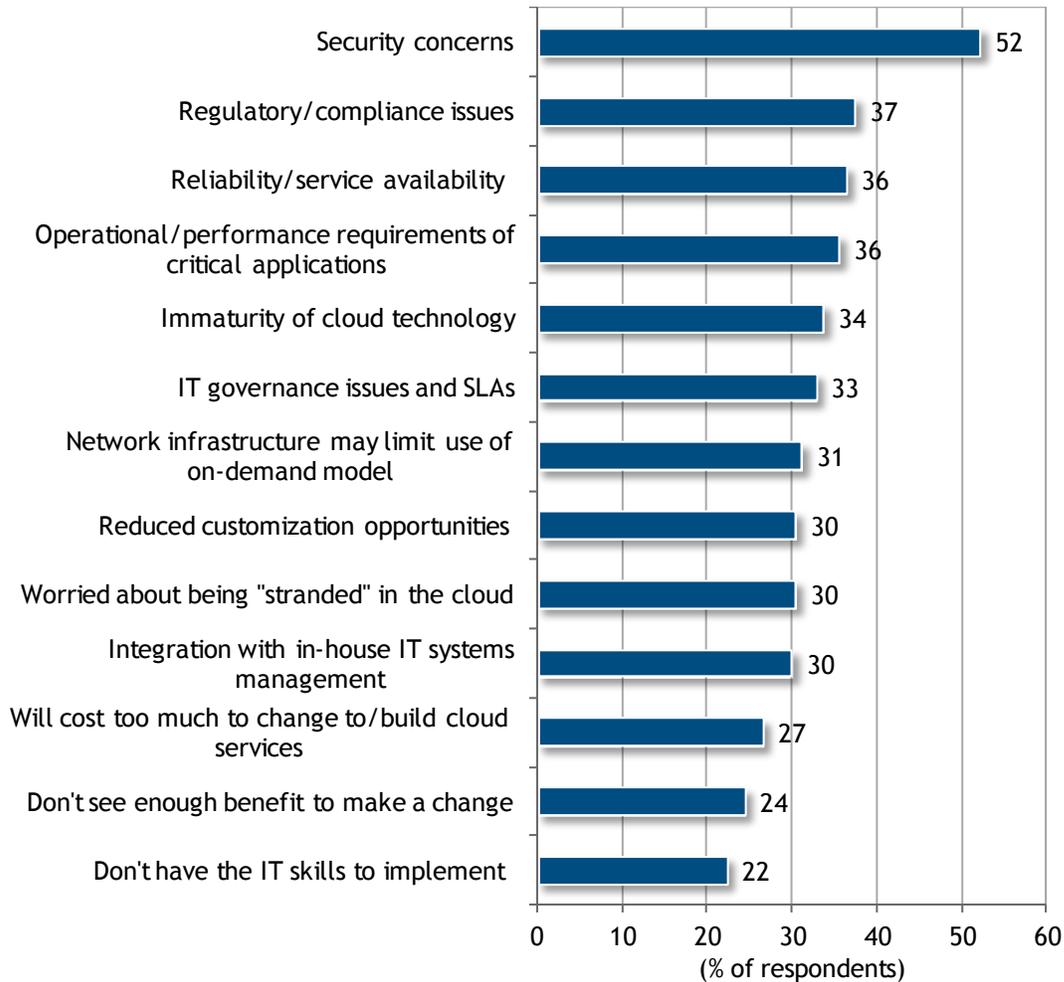
Source: IDC's *CloudTrack Survey*, 2013

Longer term, public cloud will increasingly become part of the enterprise IT mix, but at the moment, organizations are weighing the cost and agility advantages of public cloud against an array of concerns (see Figure 4). The primary challenges around adoption of public cloud services are operational in nature, boiling down to security and regulatory issues and concerns about service availability and application performance in the cloud. Interoperability and workload portability, which emerged as top concerns in previous years, have given way to more tangible issues related to day-to-day usage of cloud services, indicating the emergence of a new phase of cloud evolution in which implementation issues, as opposed to simple adoption considerations, are taking center stage. Interoperability and standardization between external and internal cloud environments represent the table stakes for application portability and the foundation for mixed environments that support ease of migration. IDC believes that security reemerges as an inhibitor once companies begin moving increasingly complex and/or business-critical applications to the cloud.

FIGURE 4

Public Cloud Inhibitors

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



n = 704 U.S. respondents

Source: IDC's *CloudTrack Survey*, 2013

While private cloud is the go-to deployment option in the short term, organizations also want the financial savings and operational agility that come with public cloud. The wall between public and private 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 comprehensive hybrid environment. Tearing down this wall means enhanced flexibility for enterprise IT organizations to provide on-demand compute and storage resources to support line-of-business users' increasingly rapid delivery timelines. Hybrid cloud can also help transform the organizational dynamics of enterprise IT and lines of business for the better by positioning

IT operations in 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 enable instead of thwart the move toward more agile cloud-based IT.

Hybrid cloud implementations enable a number of capabilities and business benefits, including the following:

- **Leveraging existing IT systems investments.** While cloud-native start-ups can leapfrog traditional IT architectures and jump straight into the cloud, enterprises cannot. Investments in equipment, software, personnel, and datacenter facilities cannot simply be written off in favor of "asset light" public cloud services. However, hybrid cloud provides self-service "stretch" resources that augment what's already in the enterprise datacenter, delaying or even eliminating the need for additional 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 implementation. But these characteristics can also create "rogue IT" purchasing and deployment, resulting in fragmented enterprise IT environments as well as security and compliance risks. Hybrid clouds that tightly link the enterprise datacenter with public cloud resources, along with well-defined policies and processes governing access and usage, ensure consistent IT governance while enabling location-agnostic flexibility.
- **The right environment for the right workload at the right time.** Public clouds generally mean a one-size-fits-all approach for each workload, regardless of the individual application profile (e.g., life-cycle stages, usage patterns, application behavior characteristics, data criticality, and data compliance). Hybrid cloud means a common architecture for both legacy and net-new cloud-native applications, with the ability to mix and match deployment environments based on specific performance, security, and compliance parameters, as well as scale-up/scale-out needs and requirements around dependency/tethering to onsite systems. In addition, the life-cycle timing of the workload is important. Applications at the proof-of-concept or development/testing phase benefit greatly from public cloud's rapid provisioning capabilities and consumption-based pricing. In a hybrid cloud environment, these applications can be moved back into the enterprise datacenter if data security concerns or regulatory mandates require an in-house production environment.
- **Bridging the divide between IT and line of business.** Hybrid cloud helps give each group what it wants: security and control for IT operations and speed and agility for line-of-business operations. To the extent that IT can incorporate external public cloud services into formalized IT procurement, implementation, 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

The Hybrid Cloud Service Provider Landscape

The hybrid cloud services market is still maturing, but a broad array of providers from different segments of the IT industry have converged around the opportunity. However, the various providers take different approaches to the hybrid cloud space, building upon their existing datacenter and infrastructure assets, integration and management expertise, support personnel, and customer relationships. The competitive landscape includes IT outsourcers and systems integrators, network service providers/telecom carriers, specialist hosting providers, hardware/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 third parties) 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 just interconnection and movement of workloads. Onsite and in-the-cloud systems must be orchestrated to work together as a single system, and workloads should be able to run in the public cloud domain without rewriting the application code or redesigning the network architecture, security policies, or business logic.

Similarly, providers in the large-scale, high-volume cloud services market are now offering variations on the pure public approach through dedicated infrastructure options, VPN-enabled private networking to the public cloud, and partnerships with private cloud platform vendors. However, the same compatibility and interoperability issues come into play given that the public and private components of the hybrid solution feature different architectures, tool sets, management frameworks, and service catalogs. Disparities among these elements must be abstracted away just to ensure proper migration – not to mention seamless "inside" and "outside" application development and execution 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 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 offered to traditional enterprise IT shops to transform not only the corporate technology environment but also the role of IT within the organization.

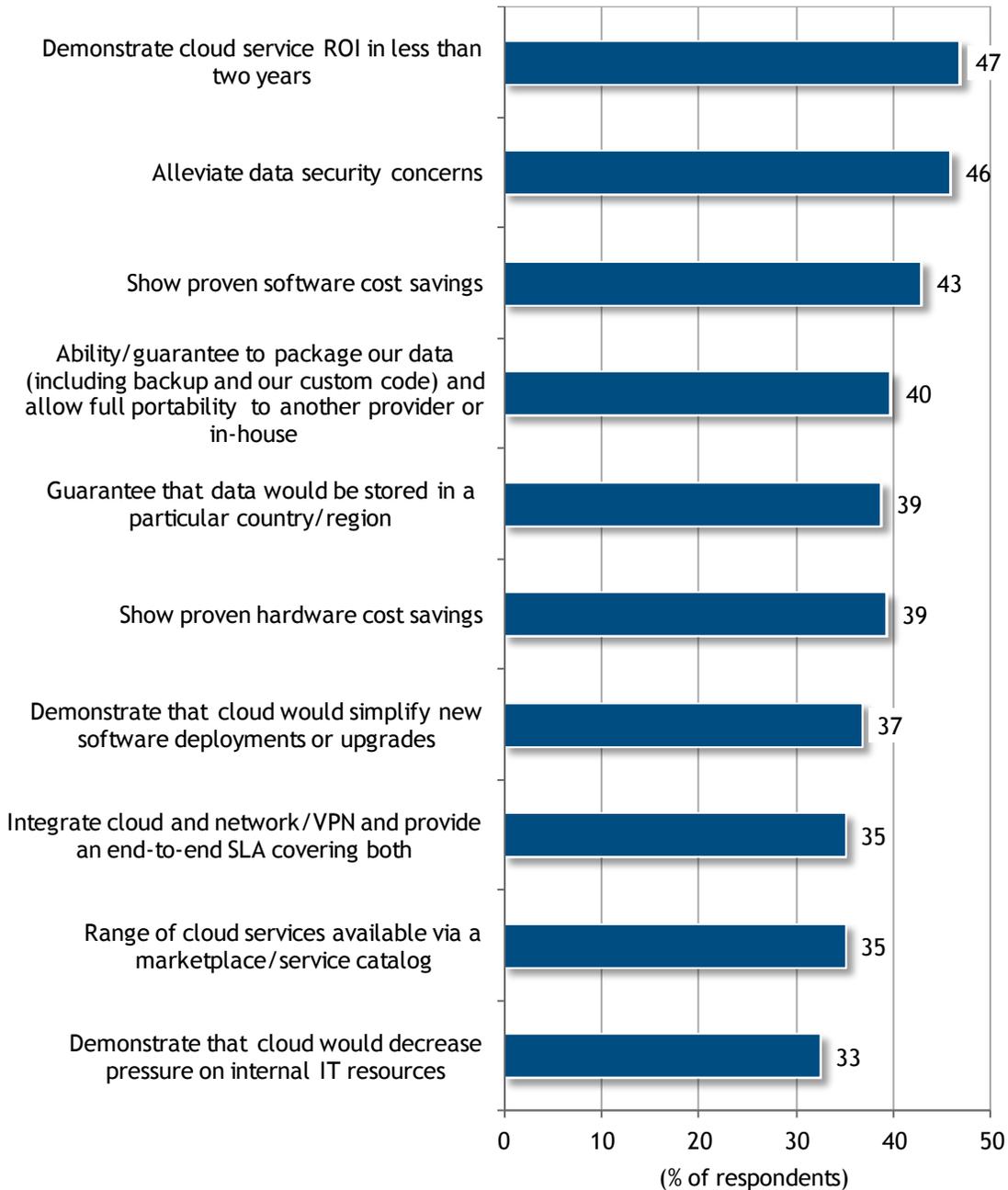
When evaluating hybrid cloud solutions, enterprises should keep in mind certain technology and organizational considerations, including the following:

- **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 get to the cloud by different paths. Transformation-oriented IT leaders can leverage hybrid cloud to position themselves as "enterprise architects" who ensure that IT 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 straddle both environments as needed, based on load/scalability, cost optimization, application life cycle, and end-user experience/proximity requirements? This decision-making process cuts along multiple axes related to 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 and 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. Cloud-aware, scale-out applications and variable-load Web-serving/compute processing tiers can live in the public cloud, 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 or just loosely connected raw compute/storage power delivered as a utility. 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, and networking); and serves as a seamless extension of the enterprise datacenter by managing internal and external resources as an overall pool of available IT capacity for end users. Other selection factors to take into account include service-level agreements, datacenter redundancy, the catalog of applications (both legacy and cloud-native) certified to run on the platform, and the partner ecosystem available to serve customers' migration, cloud readiness, and operational support requirements. Figure 5 shows how enterprises rated the importance of selected service provider capabilities and attributes.

FIGURE 5

Public Cloud Adoption Accelerators: Service Provider Attributes

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



n = 704 U.S. respondents

Source: IDC's *CloudTrack Survey*, 2013

ENABLING THE HYBRID CLOUD WITH VMWARE VCLLOUD® AIR™

Bridging the divide between the internal datacenter environment and the external cloud services domain can be a challenge for IT organizations. Public cloud is becoming an extension of IT environments as line-of-business managers, application developers, and IT leaders require enhanced IT velocity, scalability, and efficiency. At the same time, the vast majority of enterprise IT still lives behind the corporate firewall. Faced with this reality, IT leaders need solution partners that can support and 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 hybrid cloud platform offering, operated and managed by VMware, provides an integrated solution for location-agnostic cloud (i.e., onsite or offsite) IT resource provisioning, management, migration, and usage. Based on VMware's software-defined datacenter technologies, including VMware vSphere®, this service offering is VMware customers' path to the public cloud, leveraging the management framework and tools customers are already using to support current 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 connect back into the enterprise datacenter. 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 building and rework rather than performance management, application development, IT transformation, and other more strategic tasks.

VMware also brings a broad ecosystem of partners to its infrastructure-as-a-service 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 can offer additional public cloud options to VMware customers. Thousands of applications, operating systems, and infrastructure software tools have already been optimized for VMware environments and are available through the vCloud Air service catalog, ensuring not just compatibility but also convergence with existing IT investments.

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 use the vCloud Director portal to manage their hybrid cloud environment onsite. Another key offering in the vCloud Air service portfolio is VMware vCloud Air Disaster Recovery, built on VMware vSphere® Replication™. The disaster recovery service provides a dependable failover and recovery environment in the event of operational disruptions. Asynchronous replication at the hypervisor layer enables easy configuration of virtual machines in vSphere for disaster recovery.

vCloud Air's expanded global footprint includes datacenters in the United States, the United Kingdom, and Japan, and VMware plans to continue implementing vCloud Air capabilities in additional locations globally.

FUTURE OUTLOOK: LIVING IN A HYBRID WORLD

Evolution toward cloud-based IT is not an either-or proposition (i.e., public offsite cloud or private onsite cloud). Hybrid cloud introduces additional options to the cloud deployment menu for organizations. Hybrid cloud is becoming a more viable option for enterprises as cloud service providers step up to the plate and serve up solutions that leverage rather than replace internal IT frameworks, tools, and processes. 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.

About IDC

International Data Corporation (IDC) is the premier global provider of market intelligence, advisory services, and events for the information technology, telecommunications and consumer technology markets. IDC helps IT professionals, business executives, and the investment community make fact-based decisions on technology purchases and business strategy. More than 1,100 IDC analysts provide global, regional, and local expertise on technology and industry opportunities and trends in over 110 countries worldwide. For 50 years, IDC has provided strategic insights to help our clients achieve their key business objectives. IDC is a subsidiary of IDG, the world's leading technology media, research, and events company.

Global Headquarters

5 Speen Street
Framingham, MA 01701
USA
508.872.8200
Twitter: @IDC
idc-insights-community.com
www.idc.com

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