

WHITE PAPER

Building Virtualized Datacenters and Private Clouds: The Critical Role of Unified and Converged IT Infrastructure

Sponsored by: Hitachi Data Systems

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May 2010

EXECUTIVE SUMMARY

The stresses associated with the economic crisis is driving several fundamental changes in business executives' attitudes towards and priorities for IT investments. Put simply, senior executives want to undertake an "operational" transformation of IT to boost the effective use of those assets and make it easier for organizations to react quickly to major positive or negative changes in the business environment.

One of the key strategies that IT teams are pursuing to reduce capital costs while boosting asset utilization is the transition to highly virtualized data centers. IDC finds, however, that expectations for further boosts in IT asset use and operational efficiency often fail to materialize due to overloaded storage and data network facilities, overprovision of storage capacity, and a quantum leap in storage/network administration workloads. In combination, these problems can quickly overwhelm any hoped for benefits as the scope of virtual server deployment expands.

Faced with a future where organizations need to deploy and effectively use hundreds, thousands, even tens of thousands of server (and/or desktop) application instances in a virtual environment, companies should consider deploying optimally (e.g., densest, greenest, simplest) configured, converged IT infrastructure solutions (server, storage, network) that are managed as unified IT assets.

Hitachi Data Systems, a global provider of IT solutions and an early innovator in storage virtualization, is developing hardware and software solutions for enabling converged IT infrastructures. More importantly, it is also delivering the advanced orchestration management software that will make it possible for IT organizations like yours to effectively leverage a unified approach to provisioning and managing converged IT assets and services.

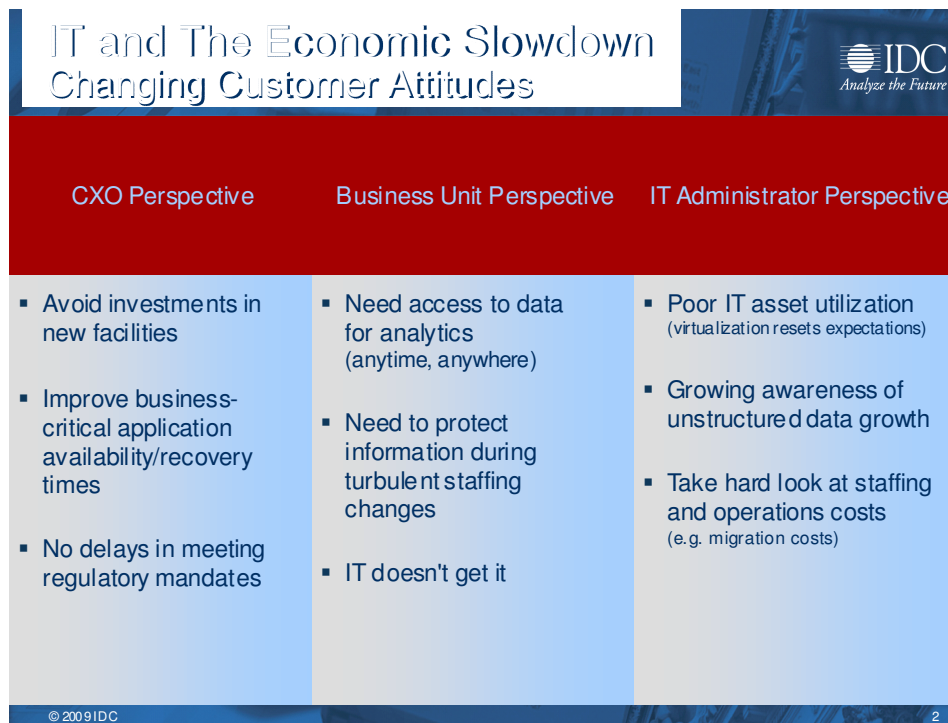
RECOVERY AND IT TRANSFORMATION: CHANGING PRIORITIES AND REQUIREMENTS

The recession and global economic crisis in 2009 had a profound effect on organizations' investment and operations priorities. Some of these (e.g., delayed capital expenditures, staff reductions) are of a temporary nature, but others accelerated long developing, fundamental changes in business practices and IT operations.

The Economic Slowdown and Changing Attitudes Toward IT

Over the past year, IDC surveyed, interviewed and consulted with a wide range of organizations around the globe to assess the short and long term impact of the economic crisis on their attitudes towards and priorities for IT investments. Figure 1 provides an overview of key themes IDC heard when speaking with C-level executives (e.g. CEOs, CFOs, COOs, CIOs), Business Unit leaders (e.g., Vice presidents of Sales and Marketing, division heads, general managers), and IT leaders (e.g. IT Vice presidents, CTOs, senior architects).

FIGURE 1



Source: IDC, 2010

Taken in combination, these perspectives translate into a number of fundamental changes in how organizations are setting priorities for new IT investments.

The most significant of these changes has little to do with technology. It represents a fundamental and sustained change in how IT investment decisions are weighed by senior executives relative to other business investments. Put simply, senior executives want to shift the ratio of capital IT expenditures to operational IT expenditures to more strongly favor operational expenditures. This "operational" transformation of IT is intended to make it easier for organizations to react quickly to major positive or negative changes in the business environment. Many executives

also believe that a more operational approach makes it more practical to target and predict cost savings from proposed investments.

Setting Priorities For IT Infrastructure Investments

Translating this "operational" mandate from senior management into IT infrastructure investment assessments is now a high priority for IT executives. The two key elements in a successful IT transformation effort are:

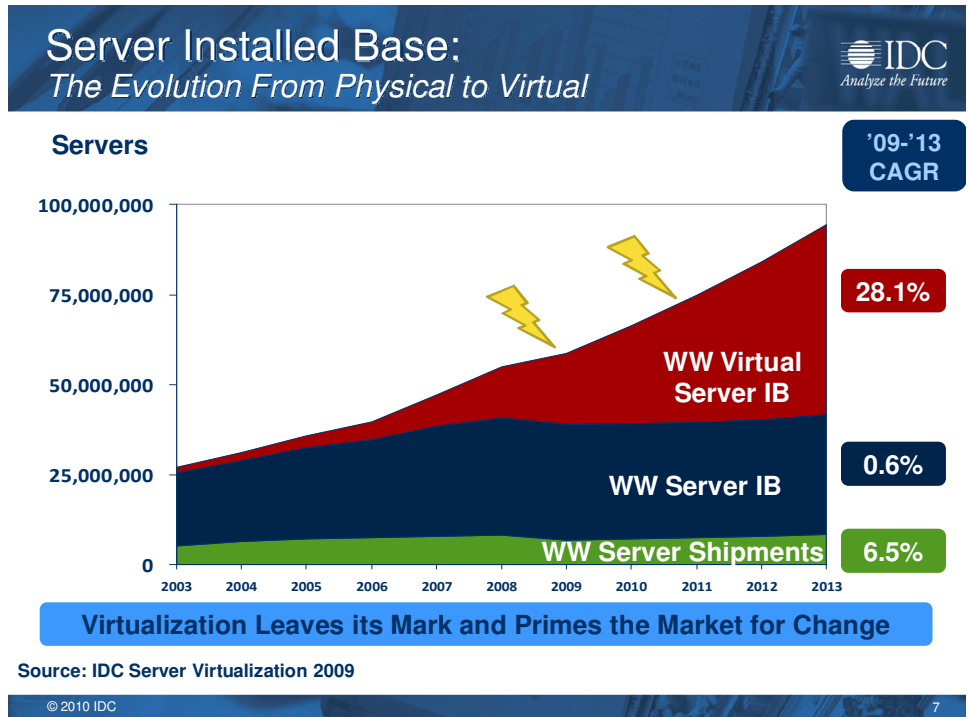
- Boost Operational Efficiency
 - Continue aggressive consolidation of servers, storage and network assets through the use of technologies such as virtualization (server and storage) and unified networks (10 GbE)
 - Improve utilization of installed IT assets with technologies such as thin provisioning and data deduplication
 - Reduce costs associated with system, data, and application maintenance and migration through use of live migration and automated data movement
 - Boost Responsiveness to Business
 - Faster, automated provisioning of IT assets
 - More reliable and timely recovery of data and applications
 - Reduce corporate risk from data loss or misuse
-

Transition to the World of Virtualized IT

Within data centers around the world, the past year was also a pivotal year in the use of server virtualization technology. IDC believes that 2009 was the first year in which more new application instances were deployed as virtual machines on a virtualized server than were deployed on a dedicated physical server.

Based upon typical server replacement cycles and new application deployments, IDC believes that the majority of all installed server applications will be running as virtual machines. The use of virtualization for application servers will only accelerate after 2011 (See Figure 2).

FIGURE 2



Source: IDC, 2010

Real World Consequences of Aggressive Server Virtualization

This transition to the rapid virtualization of server assets is clearly part of efforts to reduce capital costs through aggressive consolidation while boosting asset utilization. IDC finds, however, that expectations for further boosts in IT asset use and operational efficiency often fail to materialize. The shift to virtualized servers often leads to significant disruptions in a number of areas:

- ☒ Overloading of storage and data network facilities
- ☒ Overprovision of storage capacity and a quantum leap in storage administration
- ☒ Missed or incomplete data back and uncertain application recovery

In combination, these problems can quickly overwhelm any hoped for benefits as the scope of virtual server deployment expands.

Making Server, Storage, and Networks Work In Harmony

Early adopters of widespread server virtualization quickly recognized the perils associated with rapid virtual server growth and developed a standard strategy for avoiding problems.

First, they moved rapidly to networked storage if they hadn't already done so. This allowed them to better take advantage of live migration technologies to reduce planned downtime. The next desired step in this area will be to move to a unified network (10 Gbe based) for both storage and data network traffic to reduce cabling and reconfiguration costs while also providing greater network capacity for future growth.

Second, they virtualized their storage. The use of virtual volumes and thin provisioning allowed these companies to avoid both storage administration overload and the massive over provisioning of storage for virtualized servers. Today, the priorities in storage virtualization are the addition of data deduplication capabilities to reduce the overhead associated with virtual server backup and the use of automated data movement to lower storage hardware costs and further boost asset utilization.

Developing a Long Term Strategy for the Virtualized Data Center

While the steps noted above are critical for regaining control of fast growing virtual environments, they are simply the first steps in a long term, more systematic approach to deploying and managing IT assets in the highly virtualized data center of the future.

Faced with a future where organizations need to deploy and effectively use hundreds, thousands, even tens of thousands of server (and/or desktop) application instances in a virtual environment, IT teams are rethinking the entire IT infrastructure process from purchasing, to configuration, to ongoing operations.

The underlying goals of these efforts include

- ☒ Enable more cost effective and predictable spending on servers, storage and network equipment
- ☒ Insure that all of purchased IT assets are used to their maximum level
- ☒ Reduce the operational and management burdens associated with new application deployment, application/data migration, and business continuity

The key foundation underlying many organizations' strategy for meeting these goals is to leverage emerging converged IT infrastructure solutions.

BUILDING THE VIRTUALIZED DATA CENTER WITH CONVERGED IT INFRASTRUCTURE

Converged infrastructure is the development of a data center (or closet) based on a set of standard elements (e.g., x86 processors for compute, PCI for the system bus, and 10 GbE for inter-node and storage connections). By leveraging hypervisor and storage virtualization software, these "chunks" can then be dynamically partitioned and automatically rebalanced to support a pool of different business applications.

The goal is no longer to deploy each element (server, storage, network) individually, but to build the optimal (e.g., densest, greenest, simplest) platform. Companies can

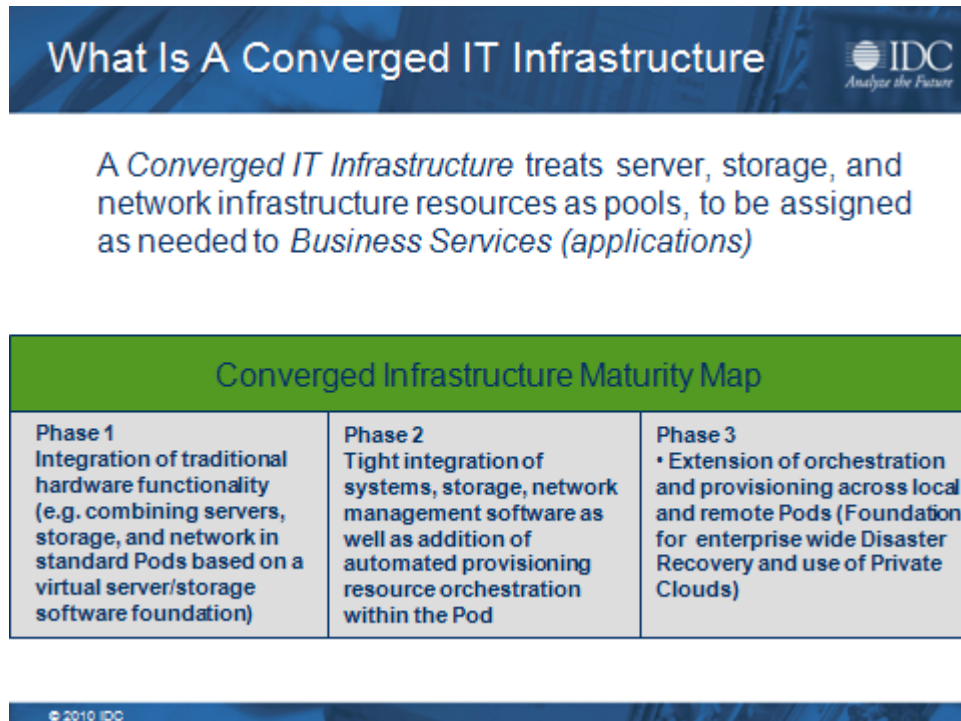
then manage the unified IT assets in these PODs (e.g., a rack, an aisle, or an entire data center built and deployed as single pool of converged IT infrastructure) for different services-oriented applications (e.g. virtual desktops, data analytics warehouses, or large content repositories).

What is the Value of Adopting a Converged IT Infrastructure?

For many organizations, the most immediate hoped for benefit from adopting a POD approach to IT asset acquisition is an upfront reduction in spending on hardware assets. In part, this is because organizations can avoid wasteful over provisioning and the continual rebalancing of server, storage, and network resources as applications evolve. Equally important, though less glamorous, IT organizations hope to get rid of much of the cable cluttering up their data centers, and this can bring surprisingly large savings

CIOs and their teams know, however, that savings in hardware spending associated with PODS can't solely justify the shift to converged IT hardware. It merely represents Phase One in the maturation of converged IT infrastructure solutions (See Figure X). Without advanced, unified, cross tier management capabilities, organizations have a bunch of hardwired hardware that can't do much - definitely not dynamically. The real savings come when IT teams can significantly improve the utilization rates for all of the IT assets in the data center.

FIGURE 3



Source: IDC, 2010

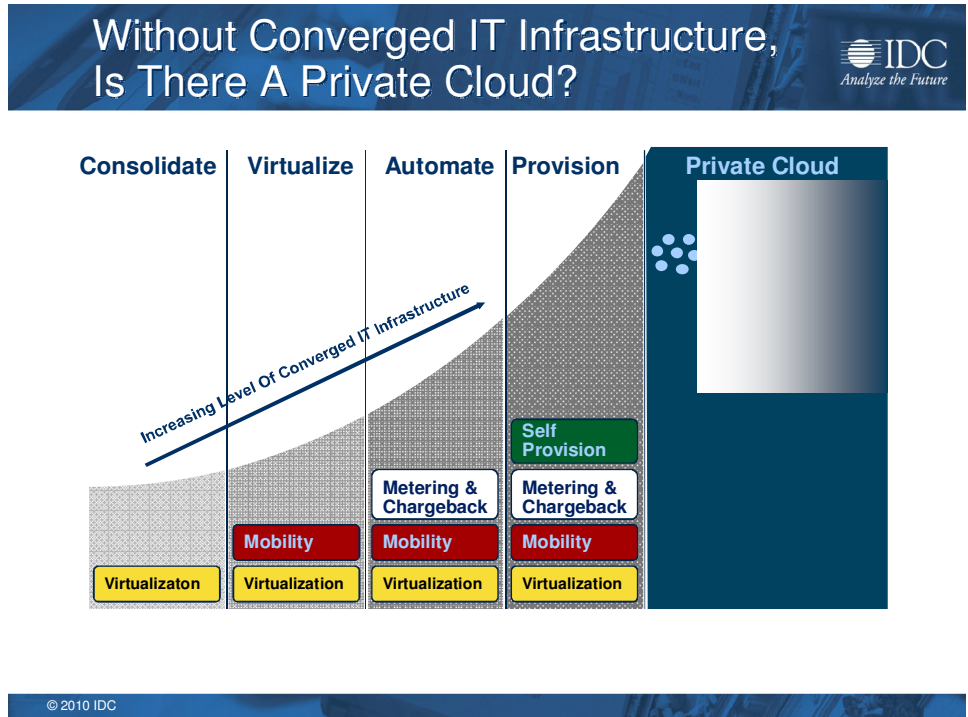
Simply providing an integrated set of existing systems, storage, and network management solutions doesn't effectively address this requirement, however. What good is converged infrastructure if storage administrators still have to provision and reconfigure every LUN and volume manually? Phase Two of converged IT infrastructure maturation is the addition of unified orchestration functions that automate provisioning and enable policy based resource management for the entire POD and the applications running on it.

Unified and Converged IT Infrastructure: Foundation for Building Private Clouds

Ultimately, the success of using a converged IT infrastructure will depend upon extending the efficient operations and automated resource management across multiple PODs in the data center, and across multiple data centers (Phase Three of Converged IT infrastructure). Without this extension of unified orchestration, IT organizations will just be creating new stovepipes, albeit at a different scale. They will also be unable to deliver effective and efficient DR/business continuity.

Navigating the phases of converged IT infrastructure maturity will also be at the core of many organizations' efforts to implement a private cloud for their business applications (See Figure 4).

FIGURE 4



Source: IDC, 2010

Many private cloud efforts focus on the shift to a service oriented application (SOA) architecture. At their core, however, they depend upon the use of a robust, scalable, and highly efficient IT infrastructure with the following characteristics:

- ☒ Virtualized IT resources to ensure maximum utilization of IT assets
- ☒ Live application and data migration to enable load balancing and high availability
- ☒ Performance monitoring and metering to enable dynamic resource management and chargeback (if desired)
- ☒ Automated provisioning to enable rapid application development and expansion

Finding a Converged IT Infrastructure Partner

The biggest challenge for organizations that want to migrate to a converged infrastructure is finding the right partner(s) to help:

- ☒ Define the characteristics of the PODs
- ☒ Integrate the converged IT systems with existing IT environments and management systems
- ☒ Retrain IT staff to support of the more unified approach to provisioning and managing converged IT assets and services

Organizations will certainly look to IT suppliers with a broad product and go-to-market portfolio (server, storage, network, management) but IT executives need be certain that these suppliers are able to overcome the most internal inertia in terms of segregated product development and go-to-market structure. They must also recognize that no one supplier will be able to deliver every element (e.g., server hardware, storage virtualization, network, management) with equal effectiveness.

Organizations should not automatically exclude suppliers that specialize in one segment (e.g, storage). These suppliers are often early adopters of converged IT infrastructure in their new storage platforms, and can partner with network and server suppliers for the other elements. They also bring advanced data management/movement capabilities that will be critical in extending converged IT infrastructure environments to Phase 3 (across the enterprise).

The remainder of this White paper will examine the Hitachi Data Systems (HDS) portfolio of products and services for supporting organizations' unified management and converged IT infrastructure initiatives. It assesses the company's current product portfolio and future plans to for delivering hardware and software solutions for tomorrow's virtual data centers.

HITACHI DATA SYSTEMS CONVERGED INFRASTRUCTURE SOLUTIONS

Hitachi Data System (HDS) is a global supplier of storage and server hardware as well as data management software products for large and medium sized businesses. It also provides a broad range of IT implementation and support services for its customer, through its partners and its own global services organization.

HDS believes that the creation, organization, and use of data increasingly determine the success of businesses and other organizations. The company's stated mission is to provide best-in-class information technologies, services and solutions that deliver the highest customer ROI and demonstrable business impact.

The HDS strategy for achieving its mission is to be a leading supplier of hardware and software solutions that can be used within converged IT infrastructures built on products from multiple suppliers. It's also delivering a holistically managed converged IT infrastructure solution, including storage, server, and networking as well as advanced orchestration management software that leverages Microsoft System Center products.

Delivering Intelligent Virtualized Storage

HDS was an early leader in the introduction of virtualized storage (a key component within any converged IT infrastructure solution) with its introduction of the Universal Storage Platform in 2004. Since the initial introduction, the company extended the capabilities and scalability of its storage virtualization solutions with the addition of thin provisioning and data tiering capabilities.

HDS also works closely with leading suppliers of servers, hypervisor software, and applications to ensure that the virtualized servers within a converged IT infrastructure design can easily take advantage of storage efficiency and advanced data replication services (for improved availability and rapid recovery). This effort ensures that organizations can select the best elements (server, network, storage) without sacrificing interoperability and efficient administration (a key criterion for assessing converged IT infrastructure efforts).

Providing a Unified Infrastructure Solution

For organizations that would prefer to deploy a converged IT infrastructure solution with server, storage, and networking components provided by a single supplier, HDS is also delivering an integrated solution (the Hitachi unified compute platform) that leverages the company's own blade server platforms as well as its storage hardware and software.

The HDS blade server solutions include advanced system partitioning functions that can play an important role in enabling automated asset provisioning and reconfiguration. To help protect current investments, the Hitachi unified compute platform will support multiple hypervisors, multiple industry standard x86 servers and multiple storage hardware. HDS is also partnering with several leading network suppliers to deliver unified network capabilities within its unified computing platform.

The key goal of the Hitachi unified computing platform is to ensure that customers can integrate this solution into existing, real world data centers, not just greenfield environments. As part of its commitment to and faith in the value of using a converged IT infrastructure approach, Hitachi Data Systems is already leveraging this same model to deliver its own Hitachi Content Platform, a highly scalable and robust storage platform to large, complex and fast growing data archive environments.

Tying it All Together With Orchestration

As noted above, simply packaging together a bunch of hardware and basic management tools is not enough to meet organizations' IT operations and IT responsiveness objectives. POD-wide, and data center wide automated provisioning and resource management are the key end state goals.

HDS is leveraging Microsoft's System Center to create a scalable, unified, and open orchestration management platform for converged IT infrastructure and its unified compute platform. This new solution will allow IT organizations to configure and manage individual converged IT infrastructure PODs as a single, unified IT resource, not a collection of independent hardware and software elements. They will also be able to tune each POD to meet specific requirements for performance, efficiency, and reliability.

More importantly, this solution will also allow customers to extend orchestration and automation across multiple PODs within a data center as well as across geographically dispersed data centers for enterprise-wide IT optimization and disaster recovery.

Challenges/Opportunities for Hitachi Data Systems

Organizations are at the beginning of the journey towards broad use of converged IT infrastructure and it will take several years to complete. To put it in context, organizations went through a similar level of convergence in the early 90s when it came to how individuals interacted with applications. Rather than using independent devices and networks to interact with different applications, organization converged on a common foundation (PCs, ethernet, and TCP/IP). Only a few minor things resulted from that development (e.g., the Internet, IP telephony, digital cable).

The one element not really touched in that cycle was the systems/servers in the data center. Now, rethinking the data center and how it's run is the top priority. The current discussions about deploying converged IT infrastructure and/or private clouds are one of the most important developments.

HDS as a leading provider of some of the core solutions (e.g., storage) in current data centers must play a role in helping companies make the transition in the most painless and flexible way possible. Part of achieving this goal requires HDS to stay focused on rolling out some key technical enhancements to existing product lines. These include:

- ☒ Extending support for 10 GbE across all of its storage products (this needs to include (but should not focus exclusively on) FCoE support)
- ☒ Rolling out more advanced automated data movement services with its disk storage systems (data tiering) and between systems as well as a wide array of data deduplication services

Hitachi Data Systems must also continue to extend the scope of unified orchestration services discussed above across multiple PODS, and across multiple locations. HDS already provides a wide range of storage and data management solutions that enable robust enterprise-wide capabilities. Extending enterprise-wide support further in other elements (e.g., server provisioning, performance monitoring, and resource management) will be critical.

More important than technology challenges, converged infrastructure poses a significant number of challenges for IT organization in terms of product evaluation, budgeting, and IT operations management. These organizations will ask HDS what it is doing in terms of services and financing to help them transition to converged IT infrastructure. HDS and its business partners must develop additional professional services offerings to help its customers navigate the change.

ESSENTIAL GUIDANCE & FINAL THOUGHTS

The transition to converged IT infrastructure will play a vital role in helping IT teams like yours meet the fast evolving business needs of your organizations. It will also be critical in efforts to reduce both the capital and operational costs of running data centers and the applications/information residing in them. To meet these objectives, your IT suppliers (such as HDS) need to deliver solutions that more tightly integrate hardware elements, provide an open operating environment, and support full orchestration of resources across the entire data center.

Merely delivering more capable solutions however, is not sufficient. Your IT organization must adjust existing product selection and management practices to fully take advantage of converged IT infrastructure. When speaking with IT executives considering broader use of this approach, IDC has three major recommendations:

- ☒ Embrace standardization of hardware and software components as much as possible as this can simplify management and interoperability challenges (be sure however, that the approach also provides an interoperability and transition path for mission critical applications on installed systems and SANs)
- ☒ Implement a mature, standardized, and centralized approach to management operations with added investment in performance monitoring and analytics as well as installing a chargeback system
- ☒ Revamp the IT organization structure to move away from device-specific (e.g., server, storage, and network) administration and move towards an IT resource (e.g., database, collaboration, and archiving) oriented structure

In addition, the IT executive team should also meet with your finance department, because a shift to a converged IT infrastructure is also likely to mean a complete rethinking of IT budgeting and cost allocation. Don't let organizational/institutional barriers stand in the way of this important data center effort.

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