



# ESG REPORT

## **Critical Design Decisions: Server Virtualization and Networked Storage**

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# Introduction

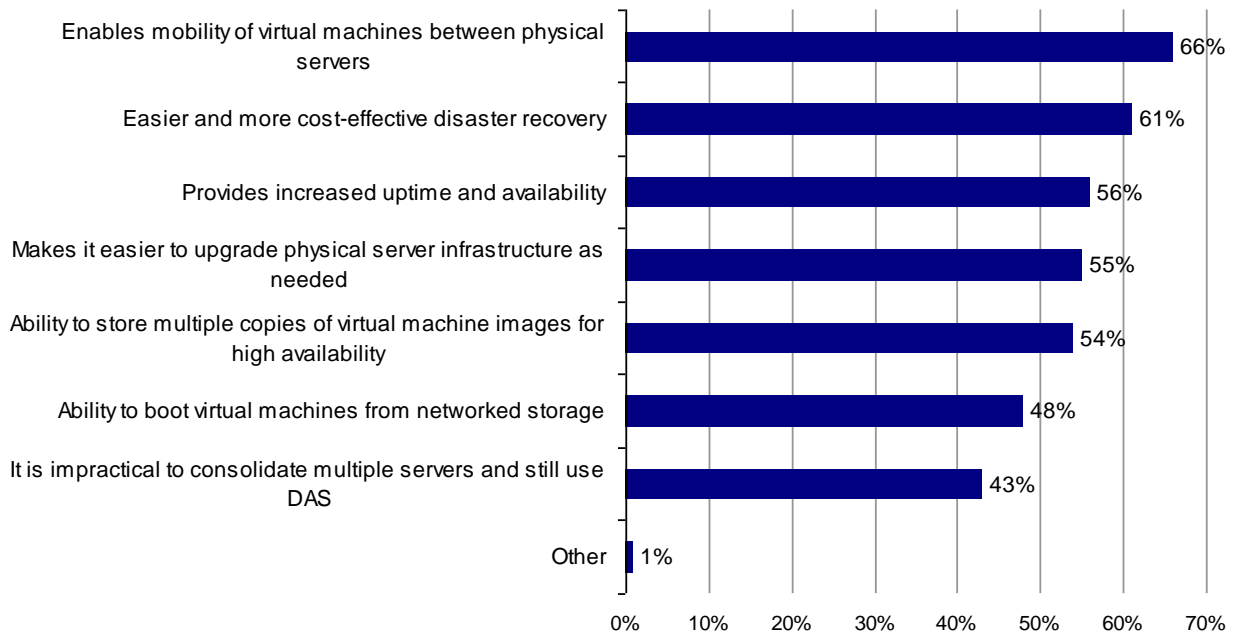
When planning virtualization initiatives, it is imperative that businesses look beyond just physical servers to consider the impact virtualization will have on the entire IT infrastructure—and the effect it will have on the business as a whole. Server virtualization is currently headlined as the latest and greatest data center technology out there and it is easy to get caught up in all the benefits it can offer without assessing the underlying infrastructure and carefully considering the effect it will have on business applications running in the new environment. A great deal of thought should be put into how to best leverage existing investments, plan virtualization deployments that can co-exist with the current physical environment and extend the benefits of server virtualization beyond the physical server infrastructure.

Server virtualization is experiencing rapid adoption and has moved beyond a test and development solution. In a recent survey of current and planned server virtualization users, 46% of the current users considered themselves to be running “Tier One” applications on virtual machines.<sup>1</sup> This is evidence that a significant shift is taking place and companies are trusting virtual machines to run their business. This shift is rapid—making careful consideration of the underlying infrastructure that supports the virtual server environment even more important.

There is always a trade off between infrastructure complexity and the benefits a technology offers. This is very evident when it comes to deploying server virtualization with networked storage. ESG discovered 86% of current users have deployed networked storage technologies to support their virtual server environments. The deployment of networked storage is essential for virtual machine mobility, high availability, disaster recovery and balancing application workloads across the physical server infrastructure. IT organizations have begun to increase their use of networked storage to take advantage of these benefits, as shown in Figure 1.

**FIGURE 1. WHY USERS WILL INCREASE NETWORKED STORAGE FOR VIRTUAL SERVERS**

**Why do you expect that you will increase your usage of networked storage for storing virtual machines and associated data? (Percent of respondents, N = 181, multiple responses accepted)**



Source: Enterprise Strategy Group, 2007

<sup>1</sup> ESG Research: *The Impact of Server Virtualization on Storage*, December 2007

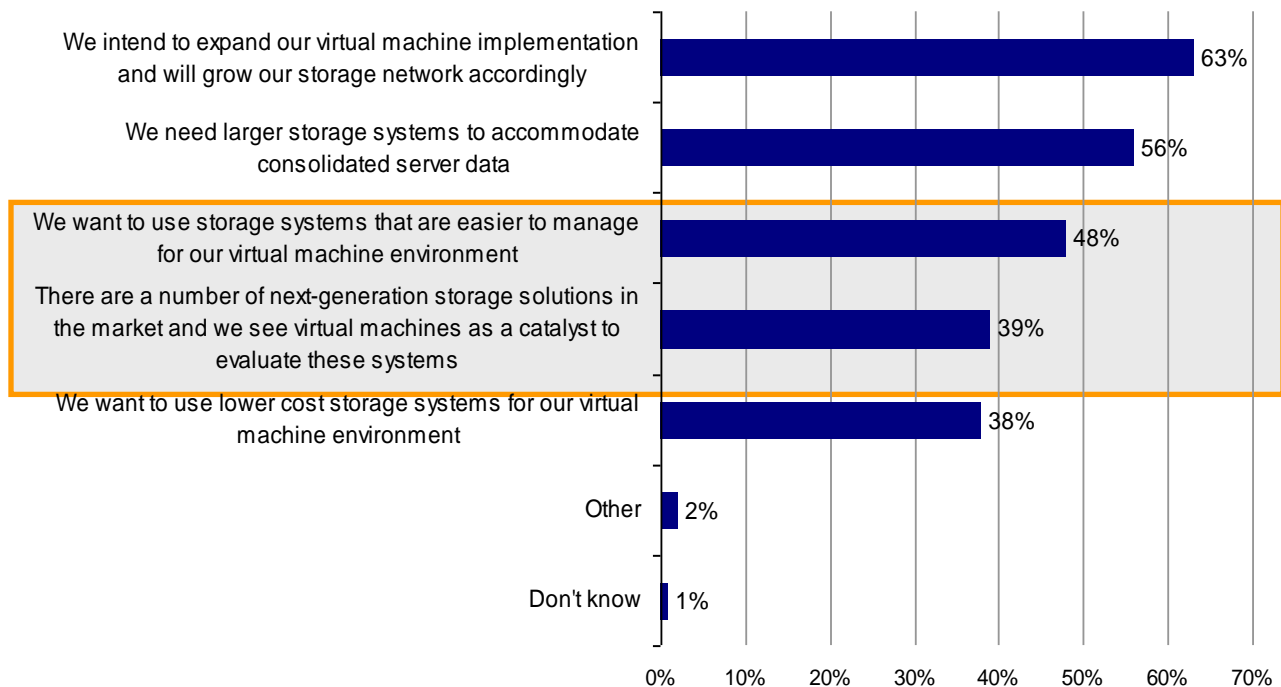
## Server Virtualization – A Catalyst for Change

IT organizations want choice when deciding which virtualization technologies to implement and they prefer a common set of capabilities that can be applied to both the “physical world” and “virtual world.” VMware continues to build value on top of ESX Server as Microsoft, Citrix, Oracle, Sun and Virtual Iron bring their own solutions to market. Inevitably, companies will eventually be challenged with managing an environment made of a heterogeneous mix of hypervisors. Therefore, it is critical that they make design decisions based on capabilities that are equally useful in both worlds.

Server virtualization is acting as a catalyst for change in the IT organization including major data center refreshes driven by physical server consolidation, increased hardware resource utilization and improved application availability. IT organizations are looking for storage systems that are easier to manage in a virtual machine environment and evaluating next generation storage solutions as highlighted in Figure 2.

**FIGURE 2. REASONS SERVER VIRTUALIZATION WILL DRIVE NEW NETWORKED STORAGE PURCHASES**

**Why do you believe that implementing server virtualization will drive your organization to purchase new networked storage systems? (Percent of respondents, N = 128, multiple responses accepted)**



Source: Enterprise Strategy Group, 2008

Storage is an integral part of virtualization initiatives. Infrastructure availability is extremely important with server virtualization since “all your eggs are in one basket.” When multiple virtual machines are running on a single physical server, it is important that the storage architecture is well integrated into the server virtualization solution so that when an outage occurs, all the applications running on virtual machines remain online. As in the physical world, single points of failure are not considered best practices when running production workloads in a virtual environment.

Controlling virtual machine (VM) sprawl is another incumbency as virtual machines are quickly provisioned—and becoming more important as virtual machines move into production environments. Creating a new virtual machine is relatively simple, which is leading IT administrators to quickly provision new virtual machines without considering the impact to the overall IT infrastructure. However, all virtual machines are ultimately linked with the

underlying storage infrastructure, meaning that IT risks difficult management functionality, proprietary file-system lock in and broken storage management if deployments are not carefully planned.

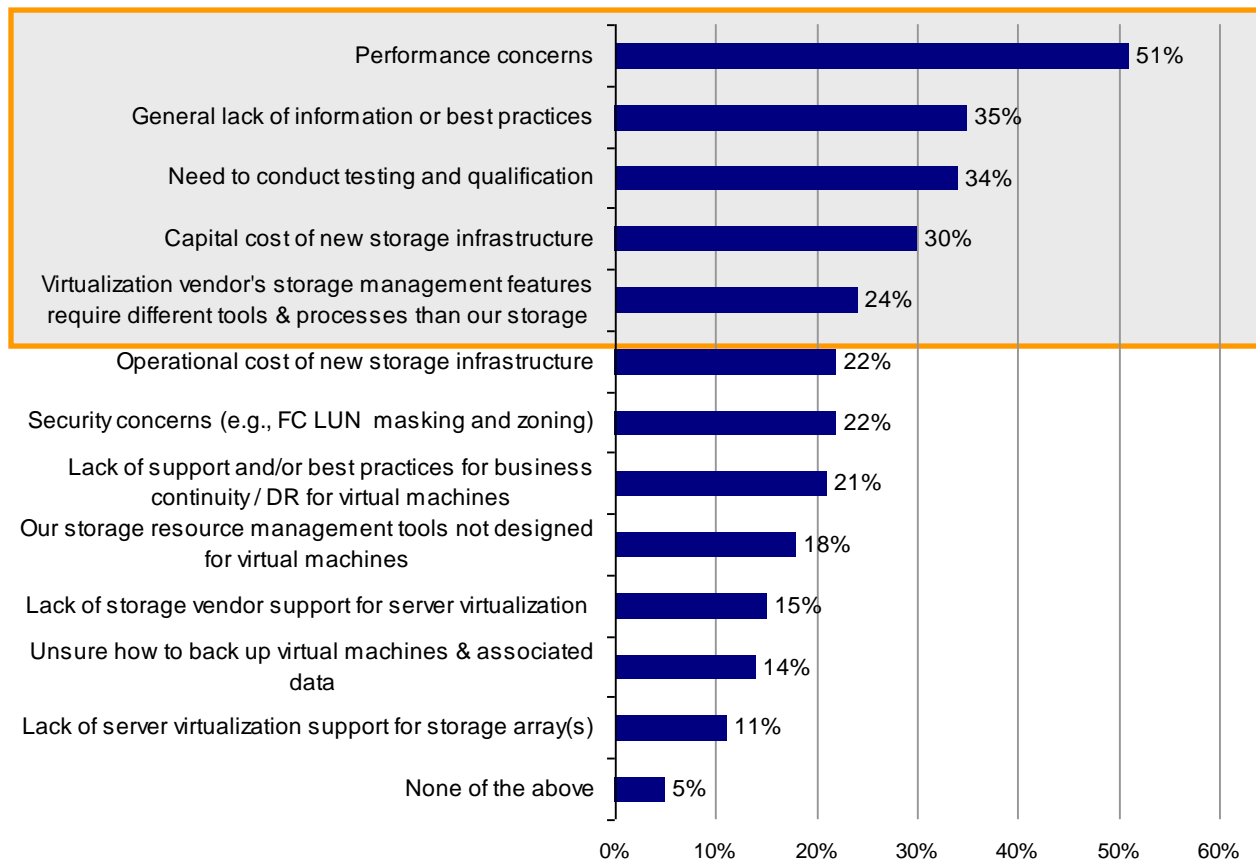
### Storage Management Challenges

Customers are looking to solve their storage management challenges in a hybrid environment—virtual and physical. They do not want to manage another IT silo that runs on its own and diminishes the value of virtualization. With change comes choice. This is also where the difficulty lies. IT organizations want to leverage their existing storage system investments including snapshots, replication and multi-pathing. Most importantly, they want to use existing process and tools to manage their storage architecture.

As shown in Figure 3, performance remains the number one concern amongst current users when implementing server virtualization. A push towards higher consolidation ratios of virtual machines per physical server and the institution of policies that run mixed workload environments across a virtual pool of hardware, I/O contention is quickly becoming a primary concern. End-users also want to see best practices for specific applications such as Oracle, Microsoft Exchange and SQL since their current best practices may not be the same as they are in the physical world.

**FIGURE 3. CHALLENGES RELATED TO IMPLEMENTING SERVER VIRTUALIZATION WITH NETWORKED STORAGE**

**In general, what are your organization's biggest challenges when it comes to implementing server virtualization with networked storage? (Percent of respondents, N = 311, multiple responses accepted)**



Source: Enterprise Strategy Group, 2008

Server virtualization solutions can make storage management a difficult task. Leading server virtualization vendors have built in limited storage management functionality, but these offerings are not well known and

proven like those in the physical world. For example, VMware requires the use of its file system, VMFS, to fully leverage advanced functionality including VMotion, HA, DRS and Site Recovery Manager. Introducing VMFS into the storage architecture has been known to break some of the existing storage management capabilities; requiring storage system administrators to learn a new process. It has also served to create tension between the storage and server teams as the lines that indicate which group “owns” the storage management responsibility begin to blur. This is leading to a technology convergence between server virtualization and storage management specialists.

## Overcoming Storage Management Challenges

The ultimate goal for IT is to deliver a higher level of service to the business. This entails faster provisioning and guaranteeing higher levels of application and infrastructure availability. Server virtualization is poised for success in these areas, but must be tightly integrated with the underlying storage architecture to deliver the dynamic, flexible and scalable virtual environments that businesses need.

**File vs. Block** – When deploying server virtualization solutions, IT organizations need to choose between file- and block-based architectures. There are tradeoffs involved: Block-based storage management solutions have advantages such as being able to only take a snapshot of the blocks that have changed as opposed to creating a snapshot of the entire file. File-based solutions have the advantage of file level awareness and the potential for easier management.

**Technology Convergence** – Integrated virtual machine and storage management solutions give administrators a single view into the environment. Integration of the two technologies enables administrators to manage a virtual machine throughout its entire lifecycle and also allows administrators to dynamically allocate storage resources, provision capacity and perform snapshots—all from the same management tool.

**Physical and Virtual** – Many storage management challenges have already been solved in the virtual world and it is important that IT organizations use what they have learned in the physical world and apply it to the virtual world. It is also important to recognize that IT environments will remain a mix of physical and virtual resources. It is important to maintain infrastructure availability across all the physical and virtual assets with a common set of tools.

**Visibility** – To effectively manage the virtual environment, it is important to have visibility into the interconnections between virtual machines and the physical storage. Once this is achieved, utilization measurement tools can be applied to effectively optimize and troubleshoot the virtual environment. Keeping track of the application running on both virtual and physical machines and being able to establish the proper connectivity and redundancy is vitally important to maintaining high availability.

**Performance** – It is important to be able to not only visualize connections between the applications and storage, but also collect performance metrics. These metrics can help avoid I/O contention and can also be used to predict the performance impact on adding virtual machines to the hardware resource pool, the impact of a failed physical machine and appropriate storage tier placement. This kind of detailed analysis is critical for determining high-growth applications and resolving performance issues.

As new storage technologies begin to emerge, it will be important that these new features can be applied across both physical servers and virtual machines. Technologies such as thin provisioning and data de-duplication have the potential to deliver magnitudes of capacity and efficiency back to the IT infrastructure. There is also emerging data protection, backup and security solutions that are being developed specifically to work in a mixed environment and provide improved functionality and protection.

## Conclusion

End-users should be looking for proven technologies that leverage existing investments and expertise. Why try to reinvent the wheel? Creating a virtual machine always involves the provisioning of additional storage resources and the process should be planned with the entire environment in mind. The potential for heterogeneous hypervisor environments is real—forcing business to make critical design decisions that offer the flexibility to adapt and provide the same features and benefits regardless of the hypervisor. Consider the value of being able to apply storage management best practices across the virtual and physical environment and deliver a common set of tools that can be tightly coupled between server and storage resources.

IT organizations require tools that have visibility into virtualized environments and provide the detailed information required to make intelligent decisions about those environments. While server virtualization can reduce the number of physical devices in the data center, the number of applications remains the same and the impact to the storage infrastructure is significant. In order to achieve true data center virtualization, the benefits of server virtualization need to continue beyond the physical server infrastructure and extend into all the layers of IT.



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