



WHITE PAPER

Best Practices for Disaster Recovery of Virtualized Infrastructure Seven Key Steps for Success

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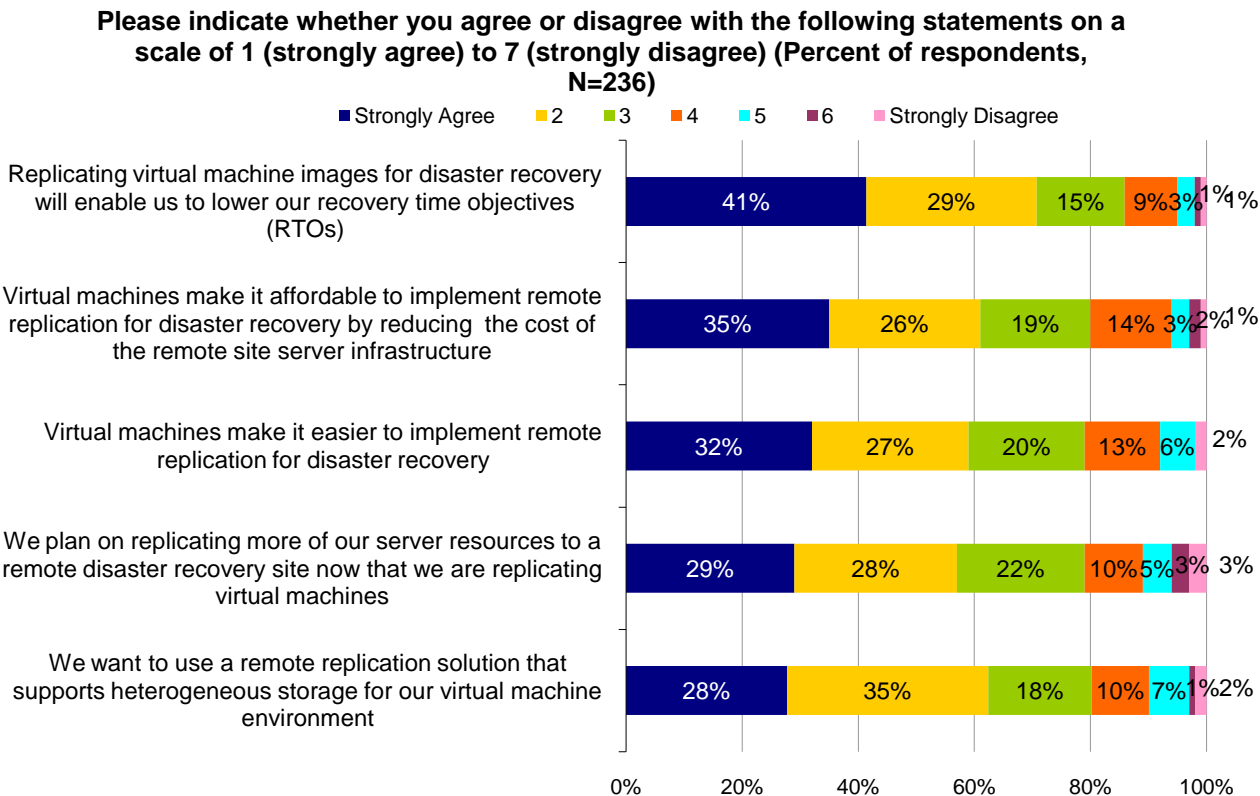
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Introduction

Server virtualization environments are becoming more pervasive in enterprise data centers. In fact, ESG research indicates that close to 40% of enterprises are now running mission critical applications in virtualized server environments.¹ As these environments expand to host production and mission critical applications, adequate protection is imperative. Though adoption is growing rapidly, server virtualization is still relatively new—and it presents a classic question to the IT organization: “What about recovery?”

Server virtualization technology is a major catalyst for change in the x86 disaster recovery (DR) environment. The technology provides new opportunities to more cost-effectively realize the benefits of higher levels of protection. For example, server virtualization can dramatically reduce the cost of recovery site infrastructure. Because server virtualization abstracts from the physical hardware layer, it eliminates the need for identical hardware configurations at production and recovery data centers, offering several benefits. First, it allows re-use of hardware at recovery locations, minimizing capital expenses. Also, by consolidating multiple applications on a single physical server at the recovery data center, it reduces the amount of recovery infrastructure required. This minimizes expensive raised floor space as well as additional power and cooling requirements. Finally, with new automation techniques—such as those available for VMware’s virtualization technology—recovery can be quicker and the skills required by operations staff to recover virtualized applications can be minimized. In fact, Figure 1 highlights the advantages organizations anticipate from server virtualization implementations in their DR environments.

FIGURE 1. SERVER VIRTUALIZATION WILL ENABLE DR ENVIRONMENTS



Source: Enterprise Strategy Group, 2009

However, some organizations will face challenges in realizing the benefits of server virtualization for DR because their approaches to recovery have been inconsistent and tactical. In many cases, best practices for disaster

¹ Source: ESG Custom Research for EMC, August 2008.

recovery are not well integrated into change, release, and configuration management processes. Disaster recovery becomes an afterthought or something that “we’ll get to later.” The adoption of virtualization has not necessarily changed this bad habit. Many companies that are adopting server virtualization are starting with proof-of-concept and do not move quickly to the discipline of an application lifecycle methodology. Additional time, skill, and planning will be required to assure that the recovery architecture operates as intended.

In all, business continuity strategies and programs should be re-examined in light of the operational and financial benefits available from virtualization technology. This paper will outline the challenges that enterprises face when trying to integrate server virtualization platforms into existing enterprise class DR environments and provide suggestions to expedite the process without burdening existing resources.

Integrating Virtualization into DR

The Challenges

Though virtual environments can reduce costs and enable operations teams to provide higher levels of protection for greater numbers of applications, they can also create substantial challenges for the organizations implementing them. These challenges include:

Having a business case to fund the disaster recovery initiative. Disaster recovery should be funded based upon the idea that there is a risk to the business if production systems become unavailable and that the extent to which they are protected is equal to the financial impact that an organization is willing to bear. However, many companies have taken a more tactical, episodic approach to DR—resulting in a lack of clear business justification of the appropriate investments for disaster recovery.

Developing an integrated virtualization and disaster recovery plan. When taking on a virtualization program, realizing that such an undertaking will involve changing the very underpinning of IT architecture and operations is key. If an organization had a recoverable posture before, it should be maintained going forward; if not, one should be included. A large virtualization program transforms an entire platform set in a company’s data center and, as part of that transformation, the business requirements for resiliency need to be part of the overall architecture. Companies that miss this part of their planning put their overall businesses at risk.

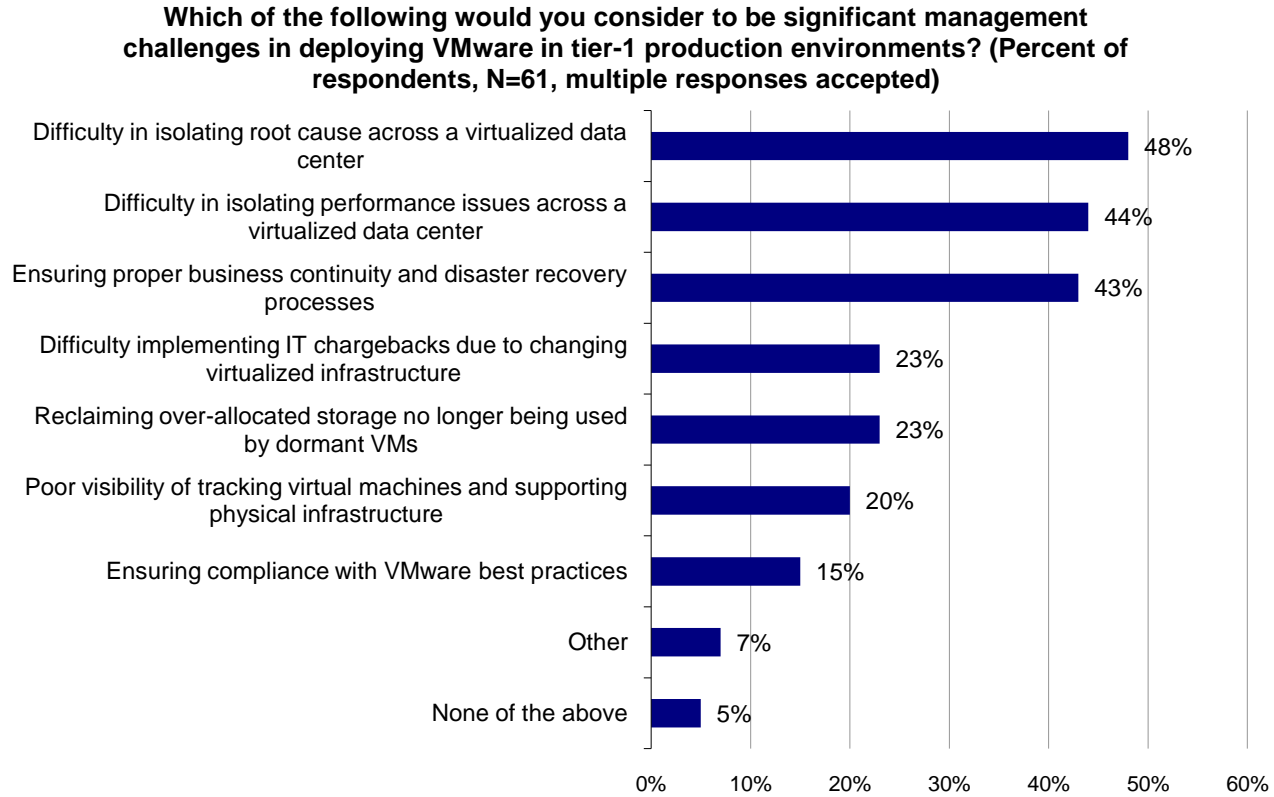
Understanding alternative protection technologies. Recovery is characterized in two distinct areas: 1) resiliency, or high availability, and 2) disaster recovery. Products or technologies that were used to increase resiliency of an application on physical servers may not work or may not be needed in the virtual environment. As an example, an application that operates on a set of clustered servers may rely on a third party software package that is not compatible with virtualization platforms. When changing to a new architecture, organizations struggle to ensure consistency and reduce the management burden.

Ensuring complete application coverage in a highly dynamic and rapidly growing environment. Server virtualization technology is experiencing rapid growth. Once platforms are in place, new virtual machines supporting various business applications can be brought online in minutes. Conversely, keeping track of these new applications can be very time consuming. What’s more, applications can just as easily be moved or decommissioned. Without access to management tools that provide full visibility into the virtualized environment, it is difficult to know whether each application is adequately protected and mapped into the recovery infrastructure.

Developing new processes for the virtualized DR environment. Virtual environments, especially those supporting mission-critical applications, create significant challenges for DR. As ESG research highlights (see Figure 2), isolating the root cause of a problem and identifying a performance issue in a virtualized environment top the list of those challenges. Both of these issues arise mostly due to a lack of availability of tools to monitor the environments. Also reported in the top three is organizations’ inability

to ensure proper BC/DR processes for these mission-critical environments. As the server teams deploy server virtualization technologies into use for Tier 1 applications, DR programs need to respond with the appropriate processes.

FIGURE 2. CHALLENGES WHEN DEPLOYING MISSION-CRITICAL APPLICATIONS IN A VMWARE ENVIRONMENT



Source: Enterprise Strategy Group, 2009

Understanding the impact to the existing DR environment. Most large enterprises will already have an existing DR environment in place. That environment may consist of secondary and tertiary locations with dedicated network connectivity to each location. While server virtualization will facilitate the integration of a number of x86-based applications into the DR environment and can actually reduce the number of servers required, DR programs need to carefully evaluate how this will impact existing SAN, storage, and intra-data-center networks—specifically, how virtualization DR functionality will integrate with existing array, SAN, or host-based DR functionality.

Seven Keys to Enable Success

Creating and maintaining a robust enterprise class DR environment goes far beyond implementing the latest technology; it requires thorough processes and experienced personnel. Once an organization has standardized on a particular technology platform, adding a new application should only require minor changes to the environment and processes. That being said, adding a whole new technology platform, like virtualization, will require significant work in all areas. The keys to successfully integrating a virtualized environment into an enterprise DR environment include:

1. Ensuring proper alignment between business owners and the DR program.

Understanding the impact of an outage is a key element to aligning the business recovery requirements to the DR recovery architecture. A virtualization program does not need to revisit the business requirements of an application if those requirements are well understood and documented. Virtualization, like any transformation program, is an opportunity for a company that does not have alignment between business stakeholders and IT to create a formal process and document that relationship. When the business justification is developed and all of the requirements from the business owners are considered, IT can utilize that information to justify how it intends to provide that service, including virtualization technology, to provide efficiency and cost benefits.

Based on this review, appropriate service level requirements can be established for each application. Keep in mind, not all applications will require the same level of protection. Even better, the recovery services catalog should be updated to reflect the available services with corresponding SLAs and costs for virtualized server environments. This should include options for single site and multi-site recovery, which will help business users select the appropriate protection for an application, enable IT to have tighter alignment with business requirements, and provide consistent services to the business that will deliver repeatable, reliable results.

2. Developing a combined strategy for virtualization and disaster recovery.

Organizations are generally looking for ways to balance cost and risk in their DR programs. By combining the programs for implementing the virtual environment for production systems and for recovery systems, the company will increase overall operational efficiency as well as maintain or increase recovery capabilities. Virtualizing the production environment without considering the recovery environment leaves the company exposed from a recovery perspective and leaves the organization with two sets of processes to maintain for a single application.

3. Understanding virtualization specific terminology.

Teams need a common language. For years, DR organizations have built up a glossary of terms and definitions, like high availability (HA), fault tolerance, storage resource management (SRM), etc. that have been co-opted by virtualization companies, but that don't necessarily carry the same meaning in a virtualization context. For example, VMware SRM stands for "Site Recovery Manager," which provides the ability to automate DR scripts, not manage storage better. "High Availability" in the language of virtualization is a rapid bare metal recovery process, not instant failover with zero downtime. Ensuring that everyone is on the same page will cut down on surprises when the DR environment is actually needed.

4. Developing a consistent technology approach for availability and recovery of virtualized applications.

Historically, many applications have turned to clustering technology to provide high availability. In a virtual environment, resource allocation, application resiliency, and N+1 hardware redundancy all provide high availability features. When looking at the high availability requirements of an application, a company may find that it can get the same results with a more robust set of tools. Developing a consistent approach to availability for virtualized applications with a common set of tools can make configuration, day-to-day management, and recovery of the architecture easier.

Some of the advanced DR features for server virtualization include:

- **SRM** – VMware’s Site Recovery Manager enables multisite recovery. This process essentially replicates and automates many of the manual scripts DR programs have been leveraging for years to fail over environments, including management of host or array based data replication technologies, in a way that allows them to be repeatable. This is not only important for failover, but also for failback, enabling organizations to recover production environments as quickly as possible.
- **P2V** – Physical to Virtual environments can be leveraged to create a more affordable secondary site. Instead of using a one-to-one physical environment, virtual machines are used in the secondary site with one physical server hosting multiple applications. This can dramatically reduce the cost of that secondary site. However, users must understand that performance may be affected when multiple applications share the same physical resources.
- **Fault Tolerance** – This functionality from VMware allows a virtual machine within a resource pool to fail over to another virtual machine with no downtime—most operations teams will relate this to clustering technology deployed in a physical environment. While this is better than previous high availability functionality, it is still limited to failover within a single resource pool and can’t be used for geographically dispersed environments.
- **Integration of storage replication technologies into virtual environments and tools** – For years, storage replication technologies have provided robust failover of application data to recovery locations. Now these technologies have been adapted so that virtualized applications and their data can be recovered in the same way. For example, storage replication adapters for VMware Site Recovery Manager are available across a full range of EMC replication software, including EMC RecoverPoint, EMC Symmetrix Remote Data Facility (SRDF), EMC MirrorView for CLARiiON platforms, and EMC Celerra replication software.

Organizations should look for solutions that have been tested and proven to be effective—at least in a lab environment. Aside from the server virtualization vendors themselves, many large storage vendors have created sizable test environments to demonstrate integration with their products. The resulting solutions demonstrate interoperability across multiple storage tiers and provide a high level of assurance that solutions created in these lab environments will work as promised in the field.

5. **Overcoming organizational issues as quickly as possible.**

When deploying new architectures, tensions can quickly mount between application and technology owners. The application owners are concerned about performance and will question the stability of any new technology. Though data centers are converging, technology domains are still closely guarded and protected. Virtualization technologies are rapidly changing that paradigm, but it will still take time. Organizations should determine how to best organize and gain the support of application owners in each distinct technology group: server, storage network, and DR. In many instances, ESG has seen organizations form new virtualization teams that are comprised of members from each domain. In other cases, the most effective way to bridge these gaps is by leveraging a professional services organization that has skills in each of these areas and can transcend application and technology silos to decrease the time and risk associated with building a robust DR environment. Before engaging with any firm, ensure that it has strong knowledge and a good relationship with the virtualization vendor as well as a strong track record (call references) of delivering value. Regardless of the approach taken, executive sponsorship is critical for the success of an initiative that crosses so many business and technology boundaries.

6. Establishing well-documented, automated recovery processes tuned for virtualization.

Mature disaster recovery programs have long relied on careful documentation of recovery runbooks and associated test procedures and plans. Typically, this documentation is very detailed and specifies particular equipment in a recovery data center. This is because the operations team at a recovery data center is often not familiar with the management of production applications from another data center. The nature of recovery procedures for a virtualized environment will be very different, because many applications may share physical infrastructure and because of the dynamic nature of virtualized infrastructure itself. This is why it's important to leverage recovery automation tools that are optimized for virtual infrastructure, such as VMware vCenter Site Recovery Manager

7. Ensuring the right people have the right skills.

Because virtualization technology is still relatively new, don't expect an existing operations team to have detailed knowledge and experience. In most cases, the server teams will probably be the most knowledgeable users, but they won't have the necessary DR skills. In a perfect world, the server and operations teams would work together to facilitate knowledge transfer, but the reality is that day to day activities normally preclude such collaboration. As a result, organizations should invest in tools to automate recovery and reduce the DR skills required by the operations staff, particularly at recovery data centers. Organizations can also educate operations teams through formal training, industry trade shows, and third party services. Virtualization vendors provide a wide range of training and certification classes that can help. This will enable operations teams to ramp up their knowledge of virtualization technology without placing a burden on the server team. Having the right people with the right skills can ensure it gets done correctly—the first time.

Virtualization technology can, without a doubt, help enhance a company's DR strategy. Leveraging virtualization's advanced features, organizations can expand their DR strategies to encompass increased numbers of applications, create more affordable DR sites, and better protect those mission-critical applications as they come online in virtualized environments. Moreover, the use of virtualization for DR purposes can be a turning point in recognizing the flexibility it brings to data center, eclipsing traditional cost considerations.

Conclusion: Getting Serious About Protection

Server virtualization environments are playing a larger role in enterprise data centers. In addition to test and development environments, virtualization is also being used to support production environments running mission-critical applications. The technology can deliver many important benefits to a business, including reduced CAPEX and OPEX spending by consolidation of servers. It can also provide similar benefits for the DR environment. However, because many of these DR features are just emerging, there is still a gap between the DR provided to virtualized vs. physical environments. Organizations need to work hard to not only create robust DR solutions for virtualized server environments, but also to ensure that the DR program can integrate these solutions into existing DR plans without creating new, separate ones.

To determine how you should address a disaster recovery initiative for virtualized applications and infrastructure for your organization, ask yourself and your team some simple questions:

- How well understood are our business requirements and service levels for recovery? Have we addressed this question with our business stakeholders for virtualized applications?
- How much effort have we put into recovery considerations for our virtual environment? Is it included in our DR plan?
- Are the virtualization solutions we are deploying well integrated with existing DR solutions (data movers, etc.)?
- Do we have a plan to educate and assure application owners that they will benefit from this architecture transition?

Best Practices for Disaster Recovery of Virtualized Infrastructure

- How robust and reliable are our current recovery procedures and tests? How could virtualization positively impact the current environment?

Organizations that have already built out a vast server virtualization environment and now need to rapidly integrate it into their enterprise class DR environment should consider engaging a qualified professional services organization to help accelerate deployment of a robust, cost-effective solution. These organizations should select only those service providers that demonstrate a deep understanding of best practices for disaster recovery operations and programs, established physical DR environments (inclusive of storage and networking), and the latest server virtualization technologies.



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