

# White Paper

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## **Delivering Greater Effectiveness and Efficiency for SANs in Virtualized Data Centers**

**EMC Ionix Storage Configuration Advisor v2**

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## Introduction

Modern businesses live and die based on how effectively they adapt to change. Given an almost universal dependence on IT to power a business, an organization is therefore only as agile as its infrastructure. Understanding technology's critical role in reaching and understanding new markets, accelerating product/service lifecycles, and driving efficiency into corporate operations, business managers have stepped up demands on IT. They expect IT to bring applications online faster, guarantee the availability and security of mission critical applications and data, and respond to constantly changing requirements with almost no tolerance for disruption.

Amplifying these challenges is a still uncertain economic climate in which IT groups must meet business demands with fewer people and resources. While ESG is cautiously hopeful that enterprise IT budgets are beginning to loosen, it is not uncommon for exceptional performance to set new expectations: as executives observe IT producing more with reduced resources during a forced march, they might resist releasing budgets even after the economic storm has passed.

Data center professionals are deploying innovative strategies to provide the performance, flexibility, and efficiency demanded by this unpredictable environment. ESG research shows clearly that the transition from legacy infrastructure technology to more dynamic, integrated architectures is accelerating.<sup>1</sup> Virtualization plays a central role in this transition as data center managers look for ways to gain the combined benefits of resource efficiency, flexibility, and performance in their server, storage, and network environments (see Figure 1). These new, virtualized data center environments help link IT resources and services more directly to rapidly evolving business demands, reduce hardware-related costs, and consolidate management tasks.

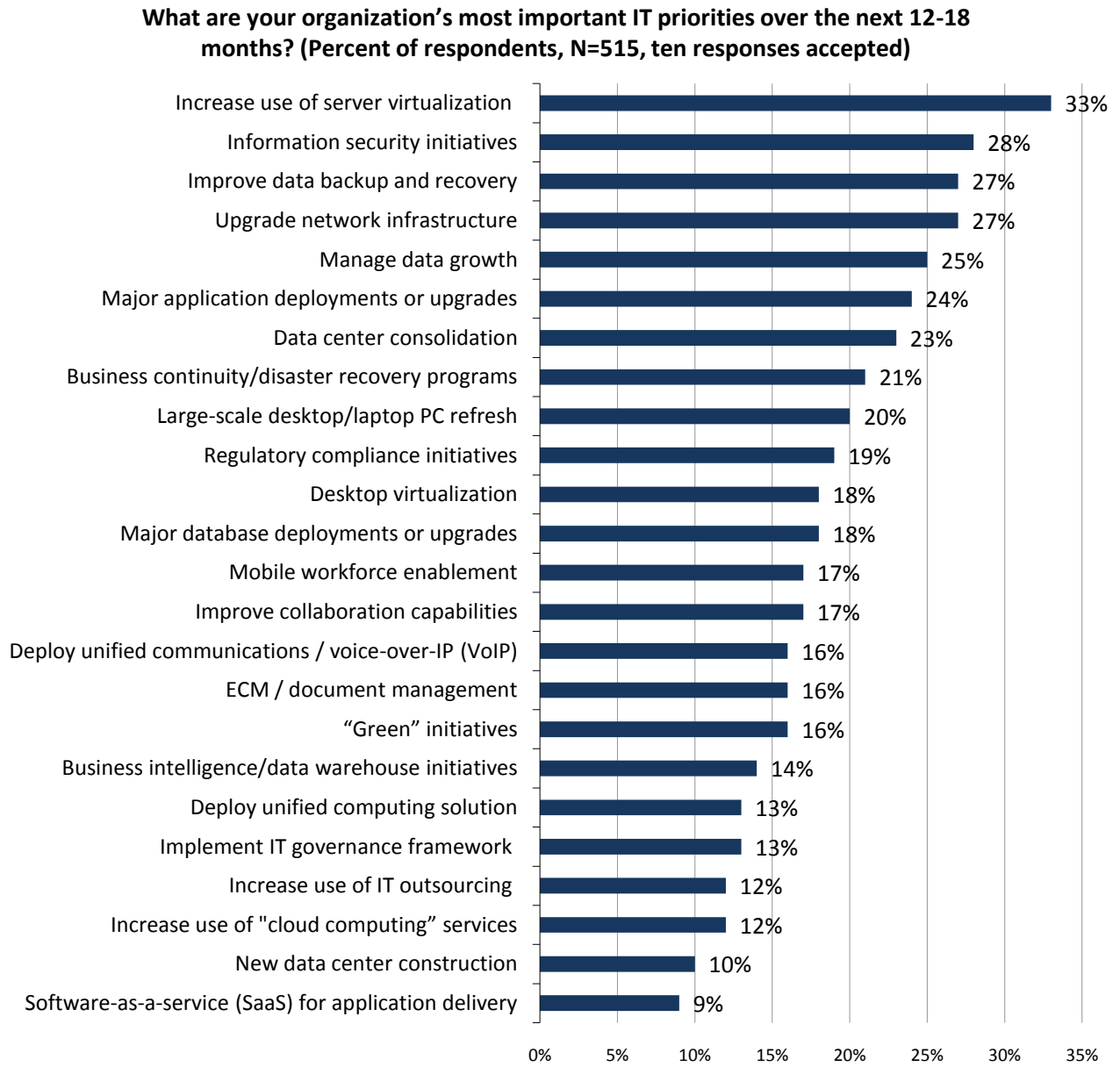
ESG has spoken with a number of enterprise IT professionals who have grown their virtualized server environments beyond 20% virtualization on their way to 40% and 50%—with an end goal of a 100% virtualized environment.

While a more flexible architecture promises to deliver significant benefits to the enterprise by tightly aligning infrastructure capabilities with the business strategies they support, it also presents new challenges. In a legacy architecture, computing resources reside on physical machines with data flowing through known, static pathways between them. Data center teams in a static environment can essentially draw a map showing the locations of critical resources (applications, servers, and storage) and the paths that carry data and requests between them. Changes to this map are largely predictable and are most often the result of planned moves, adds, or changes. In a virtualized environment, however, the map is, by definition, constantly changing and redrawing itself as the infrastructure adjusts to shifting business demands according to configured policies. Attempting to manage such an environment using legacy methods and tools can leave data center managers perpetually reacting, constantly chasing down assets, locating resources, and adjusting configurations to ensure service levels and policy compliance.

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<sup>1</sup> Source: ESG Research Report, *2010 IT Spending Intentions Survey*, January 2010.

Figure 1. Most Important IT Priorities for 2010

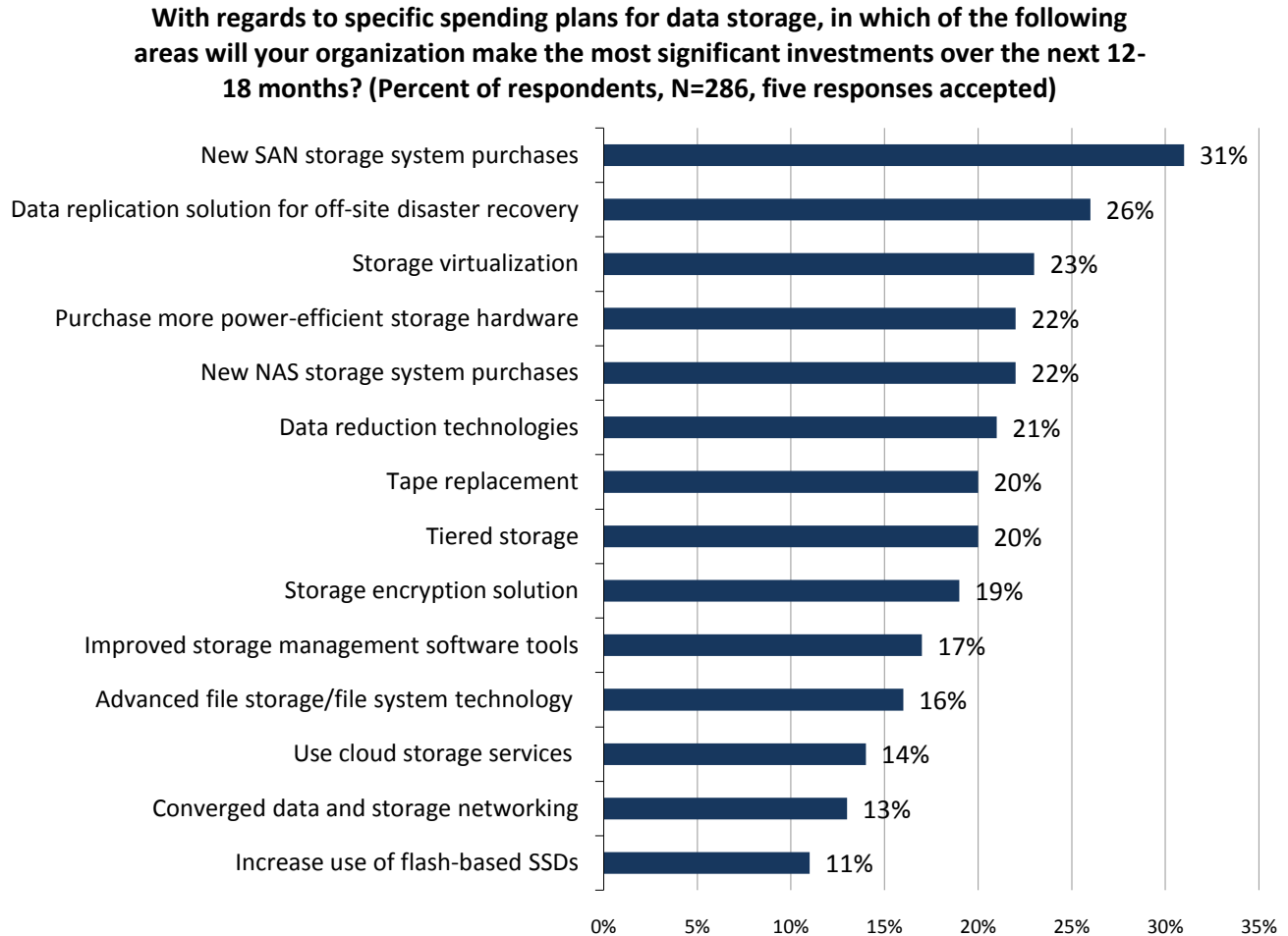


Source: Enterprise Strategy Group, 2010.

## The SAN in the Virtualized Environment

The storage architecture is an essential component of successful virtualization, and networked storage plays a predictably dominant role in the virtualized data center. It comes as no surprise that ESG research shows spending growth in storage area networks (SAN) running roughly parallel to the growth in virtualization.

Figure 2. Key Areas of Investment for Data Storage over the Next 12-18 Months



Source: Enterprise Strategy Group, 2010.

SANs enable a more dynamic infrastructure by providing the networked capabilities required to take advantage of advanced functions like VMotion, DRS, and SRM. As server infrastructures become more virtualized, SANs are growing to accommodate the need for connectivity. When new servers and applications come online, especially those in production or Tier 1, it is imperative that data center teams are able to properly and effectively provide the appropriate levels of availability and data protection in these dynamic environments in addition to being able to locate, monitor, and manage critical resources across the entire production cycle. In environments with significant industry, government, or internal compliance requirements, the ability to prove appropriate protection and availability may be mandatory.

## SAN Challenges in a Virtualized World

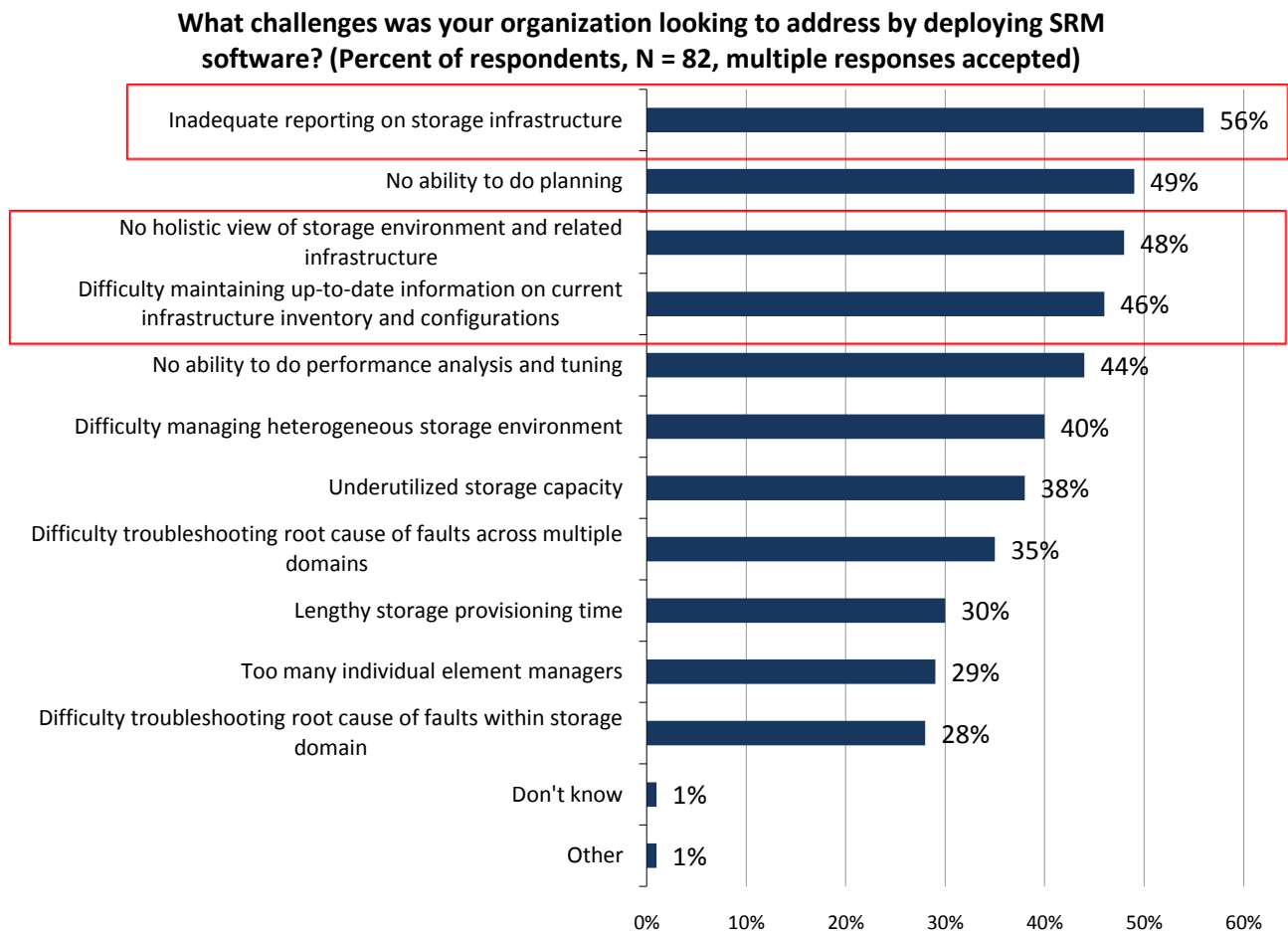
A SAN architecture can provide many benefits as the enterprise moves to a more dynamic data center. The increasingly fluid nature of a virtualized environment, however, presents challenges to the storage team.

### It's Hard to Manage What You Can't See

Visibility into the SAN has always been challenging, but it is especially difficult in virtualized environments where applications, virtual machines, and server resources are engaged in a continuous game of hide and seek with the storage environment. The dynamic interplay and complex interdependencies among infrastructure components make management difficult as a seemingly insignificant change in one domain can have a dramatic (and sometimes unanticipated) impact on another. Storage managers need to monitor the environment continuously, dynamically pinpointing resources and mapping data paths as they exist in the virtualized production environment. A static snapshot or an "as designed" view of the architecture is of little help.

Recently, ESG asked end-users about the challenges they were trying to overcome by deploying storage resource management (SRM) software. Some of their top challenges were related to an inability to get information about the storage environment, no holistic view of the environment, and difficulty in maintaining up to date infrastructure information. The complete list is in Figure 3.<sup>2</sup>

Figure 3. Challenges Addressed by SRM Software



Source: Enterprise Strategy Group, 2007.

<sup>2</sup> Source: ESG Research Report, *SRM on the Brink*, Dec 2007.

## **Maintaining Service Level Agreements (SLAs)**

While it is tempting to get swept up in new technology, IT professionals need to maintain focus on why the technology is there: it must support the business. Maintaining service levels through periods of change and growth can be difficult, but must remain a top priority—especially when it comes to supporting critical business applications. In growing SAN environments, the inability to associate an application with a data path—whether the architecture is logical or physical—can delay problem resolution, stalling production or delaying rollouts. IT needs to quickly identify which applications are affected by an issue and rapidly prioritize resources to correct the problem.

## **Enforcing Best Practices**

While no architect designs environments to fail, they can't guarantee that failures won't occur. Over time, as the production environment grows and changes, reality eventually overtakes the ideal, often producing management issues that were impossible to anticipate. The storage team can gradually lose the ability to enforce known best practices, especially if they're using legacy tools to manage a dynamic environment. Even with manual processes and checks in place, monitoring compliance with best practices in a modern data center is a daunting task. No matter how solid its original design, the nature of a virtualized infrastructure can present unforeseen changes in which things—some of them mission-critical—can fall through the cracks.

## **Managing Change (in a Constantly Changing World)**

Changes in the data center environment cause the majority of outages. In a small SAN environment where the architecture is generally static, legacy change management practices and tools (often relying on Excel spreadsheets, Visio diagrams, and “tribal knowledge”) might suffice when making infrastructure changes to avoid costly downtime. These old methods cannot scale, however, in a modern, virtualized data center. Using file-based systems with multiple versions of tracking documents, dated information, miscommunication, and confusion can derail the team's efforts resulting in extended delays when trying to correct a problem. This legacy approach to change management relies heavily on the specific knowledge and experience of individual professionals. When the data center hero leaves the company, so do the skills required to effectively manage the environment.

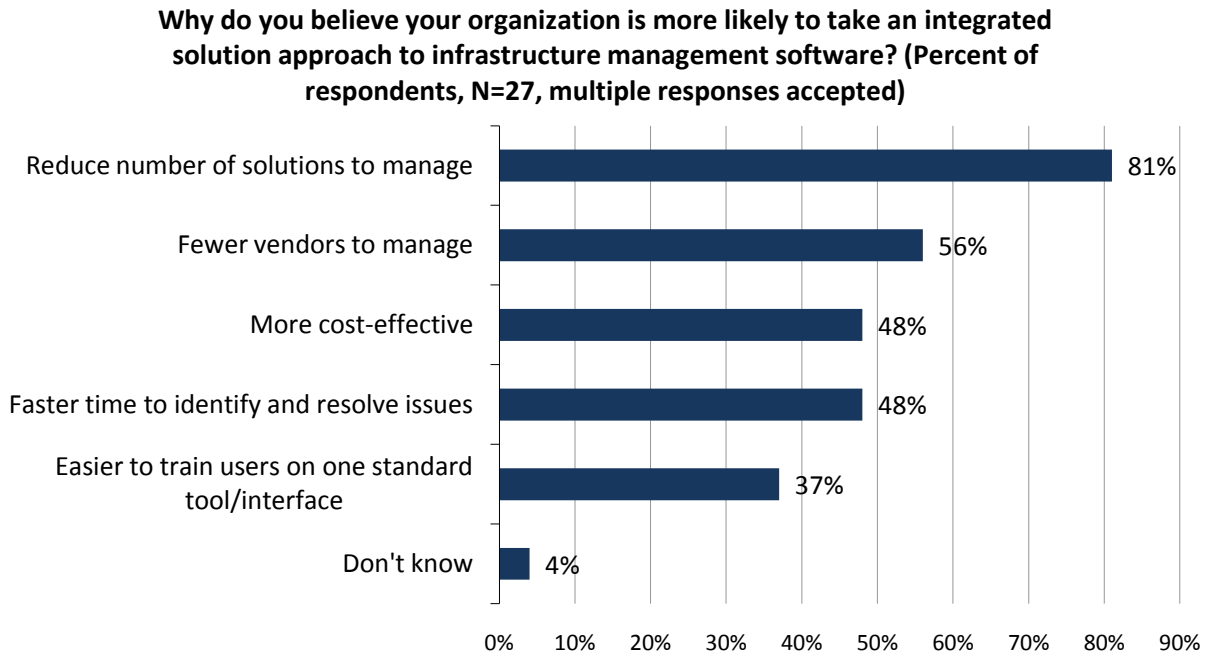
## **Keys to Enhancing Virtualization with SAN Storage**

SAN storage management systems can not only support, but enhance the benefits of the virtualized data center if storage managers keep four important themes in mind.

### **Dynamic, End-to-end Visibility**

The starting point for effective data center management is an accurate view of its elements and an understanding of the interdependencies that exist among applications running on virtual machines, servers, the network, and storage. This view helps provide context for service levels, correlating the infrastructure to the critical applications that drive the business. Gaining real-time visibility of the entire infrastructure enables IT to identify root causes quickly and rectify problems faster. Ideally, visibility will be integrated across domains to simplify end-to-end monitoring and management; this can reduce costs, accelerate knowledge transfer, and streamline cross-domain problem resolution.

Figure 4. Integrated Solution Approach



Source: Enterprise Strategy Group, 2007.

### Automation

Attempting to manage the ever-changing, virtualized data center using legacy methods is inefficient, ineffective, and inherently risky. It is important wherever possible to eliminate manual activities that are prone to inaccuracy, error, and inefficiency. Automating the discovery process for a SAN environment, for example, can provide enormous benefits, eliminating countless hours poring over and updating spreadsheets and paper diagrams (provided they can be found). Automated discovery technology, by providing an accurate picture of the dynamic environment in near real-time, saves time, reduces costs, and frees data center professionals to devote time to high-value activities like improving service levels. Automated discovery tools can help staff make informed, intelligent, and timely decisions regarding changes and planning new services.

### Control

In the modern data center, change is not the exception, it is the rule. Change control processes based on static configuration information are likely to introduce high levels of risk. Organizations need to leverage technology that can provide accurate, near real time configuration information. Even armed with this data, there is still the potential for unplanned changes to affect service levels. To help mitigate the risk created by potentially disruptive change, organizations need management solutions that can identify anomalies and alert managers of unplanned changes and policy breaches. A true change control solution should also maintain a record of all changes to facilitate analysis and auditing.

### Compliance

Organizations must be able to effectively demonstrate compliance with internal and external requirements. Internal compliance is typically associated with ensuring best practices are met and applications are protected by appropriate security measures. By leveraging policy-based management tools, organizations can be sure that best practices are followed and violations are recognized and rectified immediately. This becomes even more important when dealing with external compliance regulations like HIPAA and Sarbanes Oxley (SOX) that require data availability: in addition to data being at risk, fines may be levied for noncompliance. IT must provide an audit trail to

demonstrate compliance and adopt a repeatable process to identify improper configurations and rapidly bring them back into line.

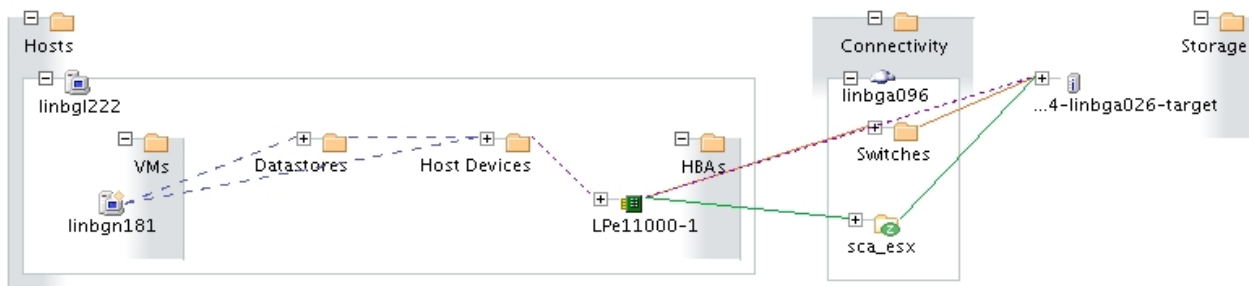
## EMC's Ionix Storage Configuration Advisor can Help

For those organizations looking to tighten control over their SAN environments in order to ensure service levels are met and comply with internal and external compliance requirements, EMC Ionix Storage Configuration Advisor (SCA) V2 can help. EMC's latest addition to its resource management software family has been specifically designed to integrate quickly and easily, and deliver near real time configuration information.

### Discovery and Dependency Mapping including Virtual Machines

Ionix Storage Configuration Advisor (SCA) v2 provides detailed coverage of the storage area network—including virtual machines, host-based multi-pathing software, and HBA firmware—through the SAN switches down to the microcode on the array. Because SCA v2 operates in near real time, it facilitates effective discovery even in highly dynamic data centers, providing users with an accurate view of end-to-end data path information. This detailed, dynamically generated view (See Figure 5) lets data center managers understand how application data is routed through the infrastructure that supports it, helping to win the game of hide and seek so that more effective management decisions can be made.

Figure 5. End-to-end Visibility Including Virtual Machines

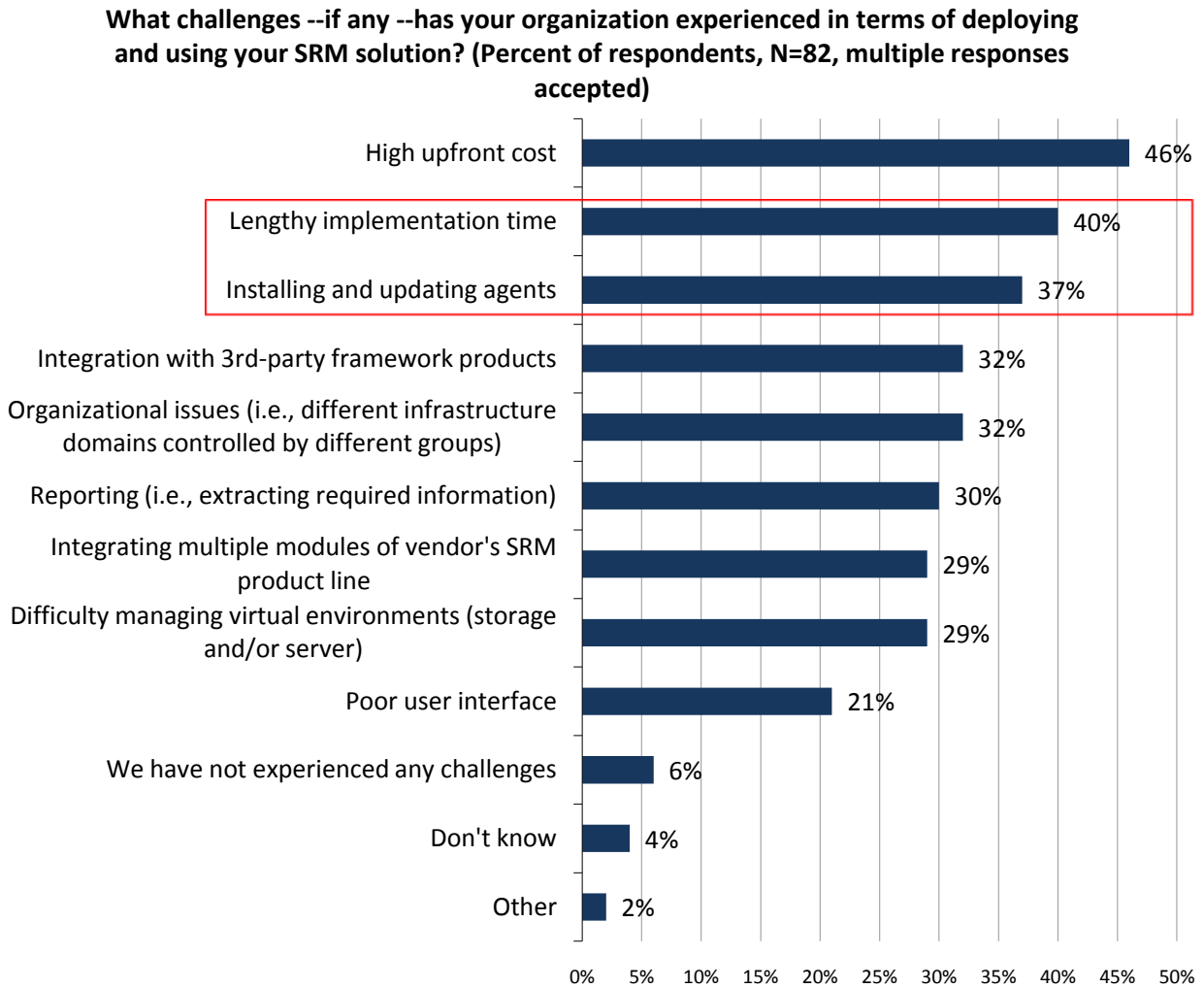


Source: Enterprise Strategy Group, 2010.

### Agentless Technology

EMC's agentless technology helps accelerate the time to deploy and dramatically reduces ongoing agent management. ESG research indicated that two out of the top three challenges in deploying resource management software are lengthy installation times and installing and updating agents, respectively. EMC is able to address both of these challenges by adopting non-intrusive discovery protocols. The result is a software package that can be quickly and easily deployed for continuous monitoring of a SAN environment—from day one to day one thousand—with very little management overhead.

Figure 6. Challenges of Storage Resource Management Software



Source: Enterprise Strategy Group, 2007.

### Change Tracking

Storage Configuration Advisor monitors discovered objects in the end-to-end path in near real time and quickly identifies any changes occurring in the environment. Accurate, timely change identification helps maintain business-critical service levels by providing visibility into changes in a SAN switch or array that could dramatically impact the performance of an application data path. In virtualized environments, SCA detects movement of virtual machines across physical servers, identifying areas where non-redundant data paths occur. The ability to track and store these changes enables IT to keep an audit trail of any change. Having this historical record enables IT to analyze incidents or trends and improve change management processes and planning.

### Best Practices Policy Management

SCA includes a selection of default policy templates intended to cover more common compliance issues like path management, physical and logical connectivity, hardware and software configuration, and support. These policies can be the basis for building custom policies. However, best practices in a physical environment do not translate into a virtual one. To facilitate the creation of these custom policies for either environment, EMC has developed policy wizards that guide users with minimal effort required. Policies can be applied to a group of objects in the SAN to ensure service levels and avoid problems

The software actively searches the discovered objects and their interrelationships to check for policy violations and notifies IT. All breaches are stored to allow users to further investigate, acknowledge, and start the remediation process. Even from day one, the ability to scan all discovered objects and identify violations will provide tremendous value as hidden, previously unknown issues will be exposed and can be rectified. This capability will be very important as more of the server environment becomes virtualized. Moving forward, it will enable IT to dramatically reduce service level-affecting issues and provide more consistent service to the business. In fact, ESG research has seen significant benefits in terms of cost, time, productivity, and business alignment for companies using this approach. Table 1 shows the benefits achieved in various areas where organizations have aligned with best practices.<sup>3</sup>

*Table 1. Benefits Achieved by Aligning with Best Practices*

<b>With regard to those process areas where your organization has fully aligned or is actively working to align with ITIL V2 recommendations, what do you believe have been the most significant benefits resulting from process best practice alignment? (Percent of respondents, N=298)</b>						
	Capital cost savings	IT staff time savings	Improved business/IT alignment	Improved business application uptime/availability	Improved end-user productivity	No clear benefits to date/Don't know
Incident/event management	53%	46%	29%	28%	24%	14%
Problem management	24%	47%	36%	26%	24%	23%
Change management	24%	31%	33%	31%	19%	25%
Release management	25%	29%	27%	25%	18%	32%
Configuration management	26%	31%	26%	25%	17%	27%
Service level management	20%	22%	32%	26%	25%	23%
Financial management	31%	18%	30%	14%	14%	23%
IT continuity management	18%	30%	26%	21%	24%	20%
Availability management	22%	23%	22%	28%	25%	32%
Capacity management	22%	29%	25%	20%	18%	34%

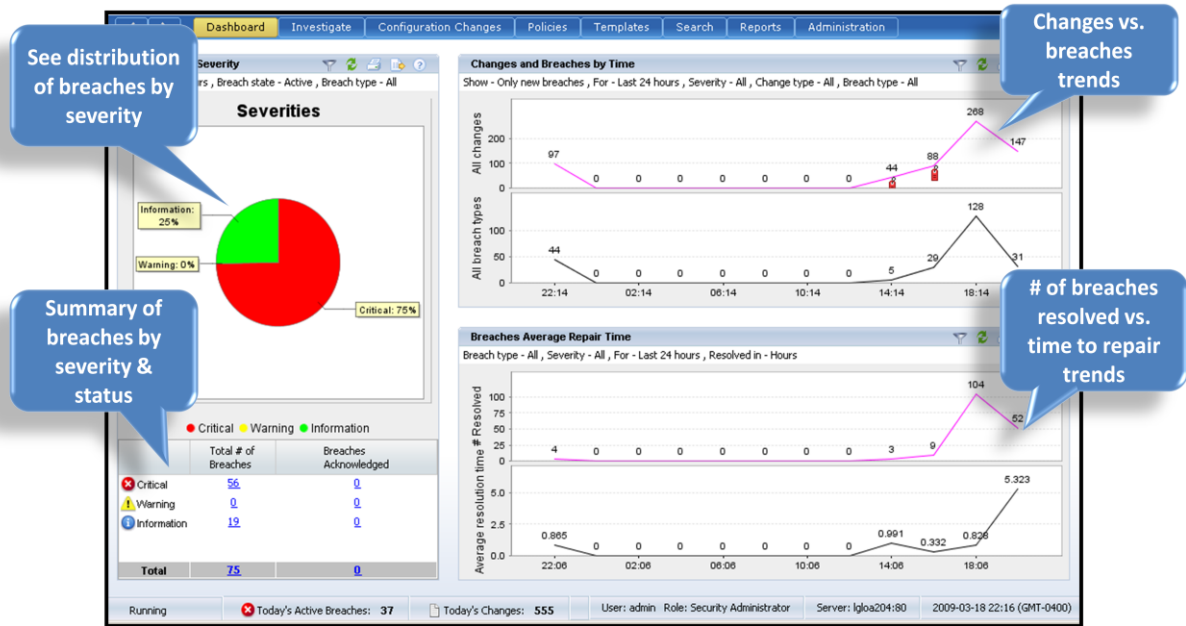
Source: Enterprise Strategy Group, 2008.

### Service Analytics

SCA V2 delivers notifications of policy violations in a variety of formats to speed resolution of potential issues and ensure the right people are made aware of them. Organizations can choose to view violations via e-mail, feed them into a management framework via SNMP, or view them through an integrated dashboard. The dashboard provides users with a general summary of all active policy breaches and configuration changes. Figure 8 illustrates an example of policy breaches and tracks the time required for a breach to be resolved. SCA generates a number of reports that include detailed information about configuration, compliance, trending, and service levels.

<sup>3</sup> Source: ESG Research Report, *Service & Infrastructure Management Survey*, March 2008.

Figure 7. SCA Analytics Dashboard



Source: Enterprise Strategy Group, 2009.

## The Bigger Truth

Data centers are rapidly evolving to better support modern business initiatives, increase efficiency, and enable rapid responses to constant change in the business environment. This evolution includes new technologies and architectures like server virtualization that, while providing important benefits, introduce new levels of complexity and risk. The pace of change in business is driving IT to be more responsive than ever and the pressure to do more with less is placing significant stress on existing staff and processes. As the data center environment grows and becomes far more dynamic, legacy management tools and manual processes can't scale to meet the challenges of this new environment.

Management solutions that automate processes and enforce best practices are required to ensure that IT can reliably deliver the higher service levels the modern business demands. These solutions need to install with minimal effort and be simple to maintain, allowing IT to stay focused on leveraging the tools to improve performance and efficiency rather than managing the tools themselves.

Storage Configuration Advisor V2 is the latest example of EMC's commitment to deliver innovative domain solutions that can be leveraged to enable a more dynamic computing environment. Its ability to provide end-to-end visibility, change management, and policy control will help keep business-critical applications running, drive operational efficiencies, and minimize risk in today's increasingly dynamic data center.



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