



## Solving Storage Headaches: Assessing and Benchmarking for Best Practices

### Executive Summary

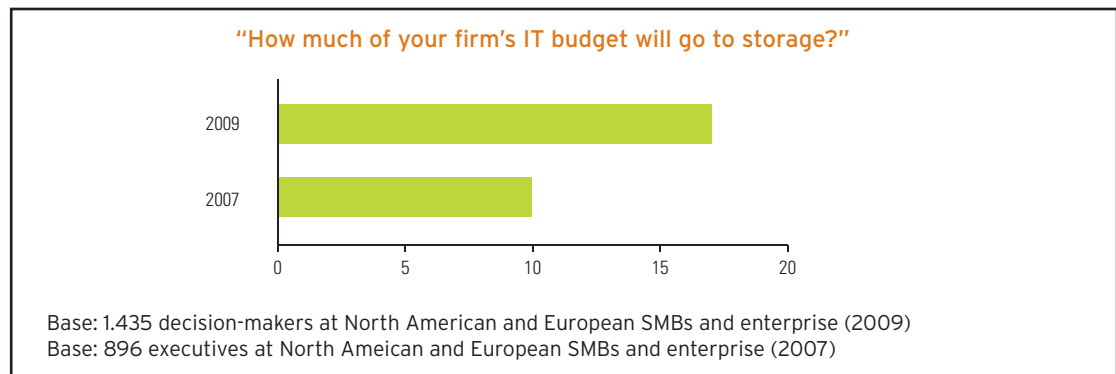
Data center infrastructure has evolved considerably in the post-dot-com era, but one thing has remained constant: explosive storage growth. Even in the weak economic environment of recent years, data growth has still experienced an average 50% to 60% compound annual growth rate (CAGR). Related technologies, such as server virtualization, have allowed IT organizations to reduce the amount spent on storage.

While newer storage innovations such as deduplication and thin provisioning help to reduce total storage consumed, they have not yielded sufficient reductions to offset the space needed for additional snapshots, remote replication, disk-to-disk backup and the like. Indeed, replica-

tion represents the most significant driver of storage growth rates. Thus, storage is consuming a greater portion of the IT budget than ever before. According to Forrester Research, Inc., storage budgets have increased from 10% of the IT budget in 2007 to 17% (see Figure 1).

While storage growth averages 50% to 60% CAGR, storage prices on a per GB basis continue to decline at 35% to 40% annually. Taken together, this means IT organizations that can limit storage growth to 45% to 50% can maintain their storage budget with zero rate of growth (see Figure 2). Of course, other factors may change the absolute budget amounts, but lower purchase prices can offset carefully managed growth rates.

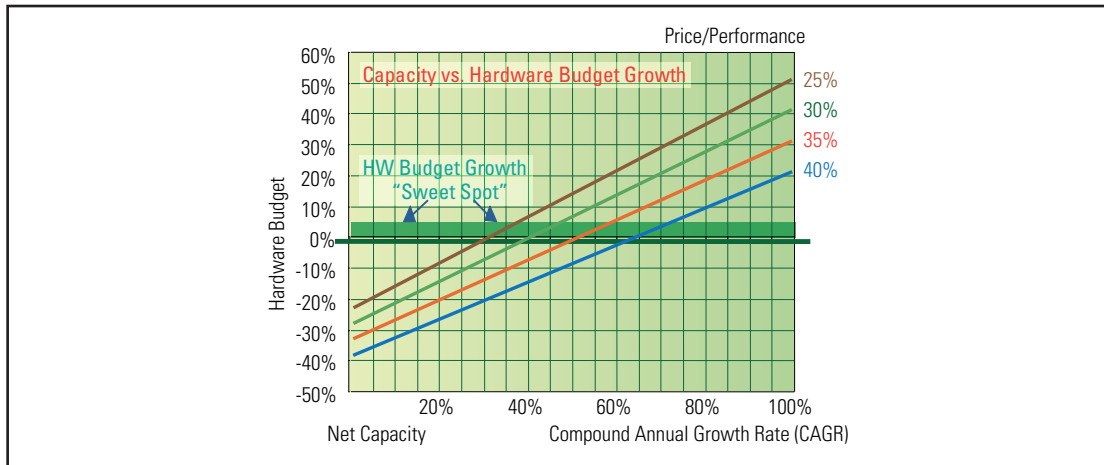
### Storage as a Percent of IT Budget



Source: Forrester Research, Inc.

Figure 1

## Storage Growth vs. Cost Reduction Budget Impact



Source: Robert Schafer  
Figure 2

### A 360-degree storage review is the best assurance against unintended consequences.

While exploding data growth is a major concern for most organizations, so is backup and recovery or, more broadly, data protection. Industry data indicates that a 15% to 25% nightly backup failure rate is not uncommon, whereas best practice is less than 5% failure. To counter this deficiency and to improve recovery service levels, most IT organizations have implemented aggressive data replication strategies, as well as disk-to-disk backup technologies. The result has been significantly improved recovery point objectives (RPO) and recovery time objectives (RTO). Nevertheless, one can easily see that these improvements in recovery contribute to the explosion of total data stored.

Although these two areas get the most attention, storage managers must also address needs around disaster recovery, compliance, archive, high availability and routine operations. Continuous improvement of the storage environment requires a constant balancing of these areas. Without a comprehensive approach, results may be less than expected, or worse, introduce unintended consequences.

#### Comprehensive Assessment

Organizations seeking to improve storage operations may determine that they have a data growth problem or perhaps a backup problem. It is not enough, however, to simply examine the problem area at hand. Optimizing one area in the absence of a comprehensive view may result in negative consequences in other areas. A 360-degree storage review is the best assurance against such unintended consequences. The objective of a comprehensive review is to identify

risk areas that require immediate attention, suggest areas with optimal gain and minimal effort and initiate prioritized action. It can give the IT organization the time and space to transform storage operations from the reactive “squeaky wheel” method to proactive best practices.

Storage is not the sexiest technology in the data center. Storage is a supporting technology, usually viewed in combination with higher-order disciplines such as application servers or databases. Without a dedicated focus, storage management can fall into one of two traps. The first is reliance on “hero worship” in which an indispensable individual or select set of individuals are relied upon to keep things running. Processes are maintained by personal (“tribal”) knowledge and systems are maintained by herculean effort.

The second short-term strategy is the “silver bullet” approach. In this case, IT organizations buy the latest hot technology positioned to address the problem du jour. Although many of these technologies have significant and real benefits, they cannot compensate for inefficient operations. Moreover, benefits are offset by increasingly complex data center configurations and operations. Although expenditures for technology appear to be action, they do not necessarily represent progress.

A comprehensive approach demands that every aspect of a storage environment be examined within the context of business operations and adjacent systems. The old adage, “If you can’t measure it, then you can’t manage it,” certainly applies. Analytical assessments apply best-practice metrics to quantify exactly how much benefit is gained from a particular effort; the data tells

## Seven Major Areas for Storage Assessment

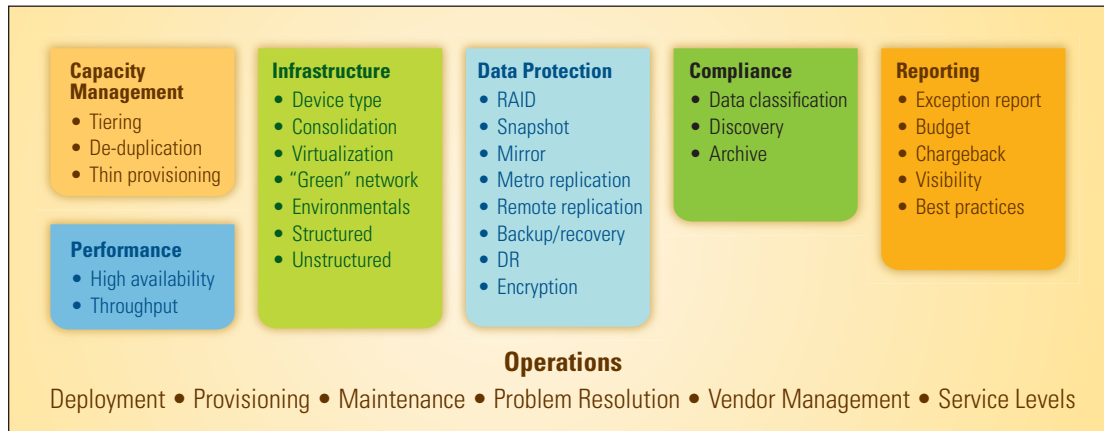


Figure 3

## Inter-Disciplinary Relationships

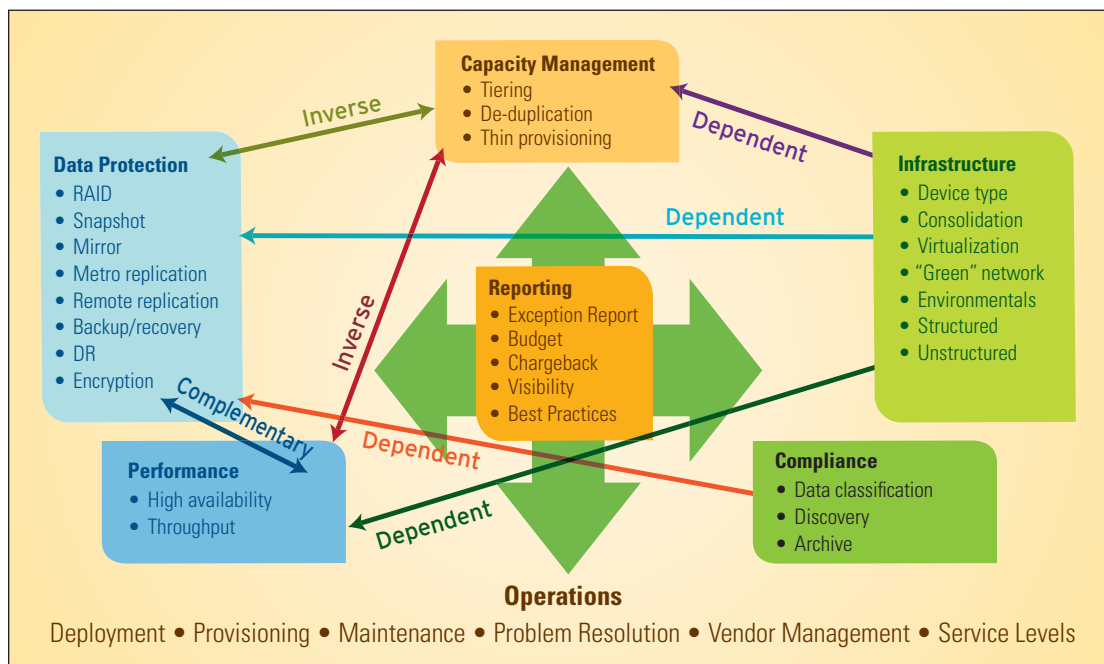


Figure 4

the tale. For example, organizations should know their storage utilization rates (raw, allocated, provisioned and consumed), storage managed per administrator, SLA compliance attainment and the like. Data has the additional advantage of facilitating clear communication with non-technical business managers, especially time-series data. Seeing period-over-period improvement gives senior management the assurance that invested dollars have been spent wisely.

We recommend that seven major areas be examined (see Figure 3). Benchmark data

highlights areas that demand attention, such as mismatched hardware infrastructure and immature operational processes. This data can also identify ticking time bombs, such as inadequate data protection, SLA vulnerabilities and out-of-control data growth.

Figure 4 represents the six major storage disciplines against the backdrop of operations, the seventh discipline. Each area has its own set of best practice benchmarks. At the same time, each discipline must be examined in the context of the others.

As Figure 4 illustrates, implementation decisions in one area, such as infrastructure, are dependent upon the choices made in other areas. One cannot make purchase decisions regarding arrays and device types, for example, without considering data protection strategies. At the same time, optimizing one area can negatively impact another area. Decisions to maximize performance and data protection can cause capacity to increase significantly. Our comprehensive approach gives IT managers a clear picture of the trade-offs and decision sequences to make informed, balanced choices.

Managing all seven areas requires special attention to achieve balance. Figure 5 provides a business-level balancing effort that IT managers must address.

**Our comprehensive approach gives IT managers a clear picture of the trade-offs and decision sequences to make informed, balanced choices.**

Managers want to optimize capacity management, optimize data protection to reduce the risk of downtime and reduce the cost and complexity of their environment. This is a classic example of the “pick two” dilemma: it is not possible to optimize all three simultaneously. In fact, selecting data protection as the highest order priority will negatively impact both capacity and cost/complexity. There is no right answer to apply to every organization; it must be a conscious decision regarding the proper proportion of risk/cost/benefit to a given storage architecture.

## Storage Assessment Methodology

We use a comprehensive, metric-based assessment methodology to determine current effectiveness and develop a set of recommendations to improve and optimize a client’s storage environment. Our methodology measures more than 40 separate best-practice benchmarks in the seven categories described in Figure 3. Using this data, critical questions will be answered:

1. What, if any, are the critical vulnerabilities? These will take the highest economic and resource priority.
2. What improvements can be made at little or no cost (ie, the “low hanging fruit”)?
3. What infrastructure adjustments need to be made; that is, what areas are out of compliance with best practices?
4. What operational adjustments need to be made to improve operational maturity?

Although these are not the only questions to be answered, they represent the rank-order of the findings. These findings will be clearly communicated to appropriate client stakeholders so that effective, reason-based decisions can be made regarding the application of resources and priorities.

Our storage assessment has three primary phases, as follows:

The kick-off stage includes the following activities:

1. Identify and introduce the client point of contact to the Cognizant team.
2. Provide the client with an overview of the assessment process.

## Balancing Storage Objectives

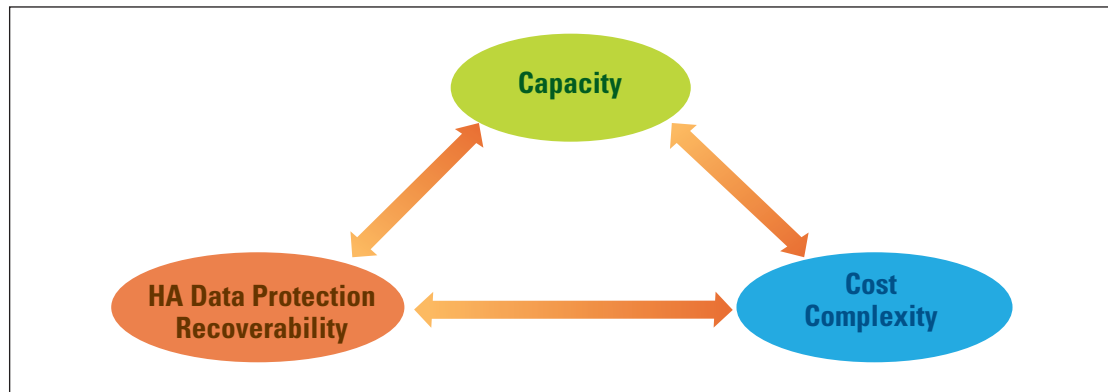


Figure 5

3. Identify, review and request the detailed business and technology information.
4. Request reports from existing reporting applications as available from the client.
5. Infrastructure architecture, counts and details.
6. Management organization and FTE counts.
7. Published service catalog, if available.
8. Jointly create a list of key stakeholders.
9. We tailor the interviews and questionnaires to the specific business needs.

The data collection stage has the following typical activities:

1. Distribute questionnaires to key stakeholders.
2. Work with the client to schedule interviews with key stakeholders.
3. Examine existing reporting tools to determine what information is available. Deploy secondary tools if feasible and if necessary, at the client's option.
5. Conduct interviews to review materials supplied with key stakeholders.
6. Remain available for follow-up meetings.

In the data analysis stage, our consultants review the data collected and create the necessary reports. Typical assessment analysis includes:

1. Utilization of physical hardware.
2. Classification of infrastructure based upon desired future state.
3. Ease and risk associated with either migration or consolidation.
4. Cost benefit analysis, if calculation is possible.
5. Initial transition plan, timeline and suggested future state.

## Conclusion

Storage management is often a secondary consideration to other IT elements, yet it represents a significant and growing portion of the IT budget. Organizations that do not take a direct approach to storage management improvement risk a cycle of reactive solutions that do not meet expectations and misapply scarce resources. Best practices benchmarking provides an essential, measurable way to evaluate storage environments. Benchmarks also provide a baseline for judging the effectiveness of actions taken. Organizations should not focus on the absolute benchmark score, but rather the relative improvement over time. Best practices are an ideal, but continuous improvement provides provable, measurable progress that contributes to the bottom line.

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## About the Author

*Phil Goodwin is a Senior Manager and Principal Architect in the Consulting and Professional Services within Cognizant's IT Infrastructure Services group, where he assists clients in the development of adaptive storage architectures, storage management best practices, backup and recovery, disaster recovery and data archiving. Phil holds a BSBA in Marketing and a Master of Technology Management from the University of Denver. He can be reached at [phil.goodwin@cognizant.com](mailto:phil.goodwin@cognizant.com).*



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### World Headquarters

500 Frank W. Burr Blvd.  
Teaneck, NJ 07666 USA  
Phone: +1 201 801 0233  
Fax: +1 201 801 0243  
Toll Free: +1 888 937 3277  
Email: [inquiry@cognizant.com](mailto:inquiry@cognizant.com)

### European Headquarters

Haymarket House  
28-29 Haymarket  
London SW1Y 4SP UK  
Phone: +44 (0) 20 7321 4888  
Fax: +44 (0) 20 7321 4890  
Email: [infouk@cognizant.com](mailto:infouk@cognizant.com)

### India Operations Headquarters

#5/535, Old Mahabalipuram Road  
Okkiyam Pettai, Thoraipakkam  
Chennai, 600 096 India  
Phone: +91 (0) 44 4209 6000  
Fax: +91 (0) 44 4209 6060  
Email: [inquiryindia@cognizant.com](mailto:inquiryindia@cognizant.com)

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