



Edison Group, Inc

Intelligent Storage Management

Business Strategy Report

For

Computer Associates

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Intelligent Storage Management**

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Introduction

Purpose of the Report

The purpose of this report is to provide information about the growing challenges of managing data storage in the modern enterprise and describe the capabilities and benefits of today's modern data storage management solutions.

Who Should Read this Report?

This report is intended primarily for organizations interested in managing data and information and its supporting infrastructure more simply and efficiently. IT administrators or those responsible for data storage management and provisioning in large business organizations can use this report to learn how to align information and its management to ever-changing business needs.

Contents of this Report

This report is divided into several sections.

- **The Growing Challenge of Managing Enterprise Data** – Describes the challenges of managing enterprise data storage in today's data-centric enterprise.
- **Business-Driven Storage Management** – Demonstrates how a truly effective data storage management solution must be driven by the business needs of your enterprise and the data you use.
- **Intelligent Storage Management** – Explains the concept of Intelligent Storage Management.
- **Computer Associates Intelligent Storage Management Solutions** – Provides information about Computer Associates Intelligent Storage Management solutions.

The Growing Challenge of Managing Enterprise Data

The amount and diversity of data that must be stored and managed by large enterprises has grown exponentially in recent years. Today's business model is data-centric — not only is data more important and more valuable than ever before, but there is a great deal more of it — and this trend seems likely to continue well into the foreseeable future. Factors such as real-time access to critical data, data safety and security, and compliance with government regulations have become crucial, as well.

In the past, "data management" often consisted of little more than ensuring that complete and timely backups were made. Today it is a much larger and more critical part of the day-to-day operation of your enterprise. A well-planned data management strategy not only can ensure the safety and security of critical data, but can actually help improve your organization's operational efficiency, reduce business costs, and increase profits. Unfortunately, a poorly planned data management strategy can lead to increased risks and loss of efficiency at many levels.

Several factors have contributed to the growing importance and complexity of data storage management in the enterprise today. The situation can be summarized in a few brief statements:

- Your data is a bigger part of the critical business processes of your enterprise than ever before — it costs more, it is worth more, and it would cost you more than ever before to lose it or to even temporarily lose access to it.
- More people than ever before want your data for legitimate business or personal reasons. Unfortunately, more people than ever also want to steal your data. Legitimate users of that data expect you to safeguard it and to provide proof that adequate measures have been taken to keep it secure.
- The diversity of digitized data is increasing — your IT systems now deal with more various types of data than ever before. Everything from tax records and images of cancelled checks to video clips of the CEO's latest speech now exists digitally and has become the responsibility of data storage management personnel.
- Partly because more things are being stored digitally, and partly because more data simply accumulates in that storage with every passing year, the amount of data your enterprise must keep track of is vast and is increasing by the minute (even while you are reading this).

The Importance of Data to Businesses

You could reasonably classify virtually all large enterprises today under two broad categories: those where information exists to drive the organization's core business processes, and those where even the end product itself is some form of information. In either case — whether it is publications and directories or customer info, orders, video clips, and financial records — that information is all critically important, and nearly all of it is digital.

In the past data was often thought of as a sort of business byproduct, something to be dealt with so that core revenue-producing activities could take place. Those days are gone. Businesses have discovered a goldmine of untapped wealth in their data, now that it's digitally stored format and modern technology allows them to tap that wealth. Almost without exception, much of the value of your business today lies in its data. Your customer lists are an invaluable part of your assets; information that helps your business processes run efficiently is clearly part of the value of your company; even data about old transactions can be mined for valuable information about your business and how to improve its bottom line.

Immediate Access Requirements

Another change that has occurred in recent times is the *immediacy factor*. Not only is there more data than ever before, but a significant amount of it must be available *right now*. Today, many business processes rely on the fact that the data be readily available — for them, data that is buried on a backup tape somewhere might as well be in a cardboard box in the basement. This data needs to be stored in such a way that it can be rapidly accessed.

The high-availability requirement of many applications, as well as the global 24/7 economy given rise to by the Internet, has made any downtime whatsoever unacceptable for business applications in many organizations — and this applies to the data accessed by those applications as well. Online commerce sites typically provide redundant storage that must kick in instantly if the main server goes down. Banking and finance organizations often take similar measures but send the data to offsite storage, sometimes located in another state, for disaster recovery purposes. Again, that type of business needs its data to be available immediately — come what may.

By contrast, a large percentage of the total data in storage may be accessed very infrequently — for example, archival data that is almost never accessed. Much of your data probably falls somewhere between these two extremes.

From a purely hardware perspective the solution to these contrasting storage needs is simple — use a high-speed solution for everything so you will not have to worry where

anything is stored. Unfortunately, with data storage equipment, speed is proportional to cost. Ultra-fast storage and the data pipes accessing it cost more — often considerably more.

Providing an optimum balance between speed and cost requires fast storage for your highly time-critical data and slower, more cost-effective storage for data that is less time-critical. Obviously, in order to properly accomplish this, you really have to know *which* data requires *what* level of access and *where* it is stored. This adds another layer of complexity onto the complexity caused simply by the sheer number of storage resources within the typical enterprise organization. Ideally, your storage management solution will help you determine the storage resources appropriate for each file or block of data. In fact, some of today's advanced solutions can even automatically migrate your data between different storage media based on frequency of access, age, or business value.

The Longer Life of Today's Data

Data in today's enterprise also has a longer lifespan than ever before. Its increased importance has led most businesses to keep proportionally more data longer than ever before. Much of that data is still actively used by at least some business processes, so it must remain actively available. The fading idea of keeping data available for a specified time and then archiving it in "cold storage" has given way to more complex storage management requirements — you may be able to move less frequently accesses data to slower, lower-cost storage devices, but it must remain available in a timely manner if and when it is needed.

Another reason for the longer lifespan of data today is security. Since most business is conducted today in the digital domain, for many enterprises stored data constitutes virtually all of the "paper trail" for their business processes. Due in part to today's compliance and regulatory mandates, not only financial and sales records, but such daily data as e-mails and website logs must now be kept in case they are needed at some future point. If this data is stored safely it can often help to reduce risk and mitigate liability — conversely, if it is corrupted or simply cannot be located, the results can be ruinous.

In the wake of several disastrous failures of major corporations (including ENRON and WorldCom), the government has recently enacted several pieces of legislation, including the Sarbanes-Oxley act and HIPPA, which require that certain critical data is retained in a secure fashion. Some regulations explicitly require that certain types of data be retained for a specified period of time. Others lead to situations where, while a company may not be *required* to maintain a paper trail, they choose not to at their own financial and legal peril. A company could face significant fines if they fail to comply with these regulations as well as leaving themselves open to serious liability if things go amiss.

Keeping Your Data Secure

Another growing concern in recent years is data security. Unfortunately, the same factors that make your data more valuable to your company also make it more valuable or threatening to other businesses and individuals, who may wish to steal or tamper with it. Business-critical data such as customer lists and credit card numbers *must* be kept safe — not only from loss, but from unauthorized access and modification. This is made more difficult than ever before, both because of the volume of data in use today and because of the complexity of modern business processes. In simple terms, you must ensure that all of the right people have access to the right data, and that the wrong people do not. Unfortunately, this simple goal it is often difficult to achieve, and often involves multiple levels and types of technology solutions. These, and the processes in which they play a role, entail a complex management challenge in their own right.

Business Processes and Heterogonous Storage Software and Hardware

Most large enterprises today have a highly heterogeneous network infrastructure — this applies to both the hardware and software on which their business processes run and to the backup and data storage management solutions already in place. In most cases this means that storage management is being accomplished using a variety of hardware and software.

Often storage management hardware devices are incompatible and operate virtually independently — each may require its own specific software or management application. This leads to ever increasing complexity and management overhead as devices are added or repurposed. One simple solution would be to replace the entire infrastructure with a new unified solution, but this is impractical from the standpoint of cost.

What is really needed is a way to centrally manage a heterogeneous collection of data storage devices that can fully leverage the capabilities of the hardware already in place. Such a solution would improve business efficiency and achieve optimal return from that hardware while at the same time simplifying management and reducing management overhead.

How Have Organizations Responded to the Challenge?

The basic response to this challenge by most organizations is just what you would expect — they purchase additional storage capacity. The continuously falling cost and rising performance and capacity of data storage hardware has made it easy for most businesses to simply continue adding capacity as they need it. The typical result of this

process of evolution is a large heterogeneous group of data storage equipment — frequently including multiple technologies from multiple vendors. Unfortunately this can lead to several types of problems including less efficient use of storage resources, increased levels of management complexity and cost, and an increased risk of unforeseen problems.

Less Efficient Use of Storage Resources

Allowing a storage solution to simply evolve without proper planning often results in inefficient use of resources simply because allocation of those resources has been determined solely by their availability rather than by considering the business processes they serve. Replaced equipment often becomes hand-me-down storage resources for other applications, for example. Studies have shown that businesses typically use as little as 20 percent of their overall storage capacity.

Increased Management Complexity and Cost

With an increasing number of different devices made by different vendors, the complexity of managing the entire system increases, as well. Instead of working with a single interface, your IT personnel must be familiar with several. This gives IT personnel a harder job, requires more training, and makes those personnel harder to replace. All of this increases the IT costs your business sees.

More far reaching, incompatibility between various devices and platforms ordinarily makes a truly useful holistic view of your data storage infrastructure little more than wishful thinking. Attempting to automate processes across multiple dissimilar platforms may be difficult or even impossible.

Increased Risk of Problems

Complexity can lead to problems. Because the “management interface” is really a heterogeneous collection of often-incompatible and inconsistent software, the likelihood of simple human error is quite high. For similar reasons, automated procedures that work perfectly when used with one device may produce unexpected results when used with another. Without a holistic view of the entire storage infrastructure, problems not only occur more frequently but are more difficult to detect and troubleshoot when they do. They may be difficult or impossible to isolate and fix and, if undetected, could have more disastrous consequences.

How Has Your Organization Responded to the Challenge?

Considering what we have discussed so far, where does your organization fit into this picture? Can its storage management solution be described best as:

- a) A comprehensive, well-planned and implemented, easily managed masterpiece of infrastructure reliability, performance, efficiency, and flexibility?
– OR –
- b) A complex, heterogeneous collection of hardware and software that has gradually evolved into its current form and which usually gets the job done but is virtually impossible to manage?

Business-Driven Storage Management

These same challenges are currently being faced by virtually every large enterprise in the world today, and several of the more visionary vendors have developed products and strategies to overcome them.

Traditionally, a storage management solution is designed around the capabilities of available hardware and software. By contrast, a business-driven storage and storage management solution will instead be designed around the requirements of the business processes it serves. Ideally, this new solution should be able to deliver the performance, manageability, and security required by modern business processes while also efficiently leveraging the data storage hardware already in place.

Generally, three main approaches to creating a business-driven storage management solution are offered by today's vendors:

- **Point solutions** – solutions typically consisting of multiple products that each address a specific aspect of storage management. This approach offers the benefit of letting an organization choose “best of breed” products that may truly excel at what they do. It is common, for example, for an enterprise to deploy a backup product from one vendor, an SRM product from another vendor, and a SAN Management product from yet another vendor. Often these products come from hardware vendors and are bundled with hardware systems. Since each is a single product, a point solution can offer the advantage of management via a single interface. It is a good solution in so far as that one product serves all of your current as well as future storage management requirements. However, addressing any additional requirements now or in the future may require the addition of other point solutions from other vendors. Hardware bundled solutions, for example, often do a good job of managing that vendor's hardware but not hardware from other vendors.

Introducing additional point solutions will, of course, defeat the goal of single-point management.

- **Application suites** – a group of applications intended to work together to provide the functionality of a unified product. Storage application suites typically involve several products, each addressing an important aspect of storage management, that are engineered to work together in providing a complete solution. An application suite may be an important step in the evolution of a unified storage management product, or it may really just be a collection of point solutions tied together by some scripting and a common interface. To be effective, an application suite must be composed of elements that are designed to work together — and backed by a vendor who has the vision and commitment to evolve it into a unified whole.
- **Unified storage management products** – a storage management product that provides management and control for all of your data storage devices. This solution is ideal, since it allows you to optimally leverage the capabilities of all of your existing hardware as well as add new hardware as needed, while still providing a single management interface. The drawback here is that such a solution is difficult and expensive to create and support. A unified storage management solution can succeed only if the vendor who creates it has the initial resources to design it to work well with virtually all storage devices in use, in addition to having the commitment and resources to ensure that it continues to do so. Many point solution vendors have incorporated limited support for competitors' hardware into their management interfaces and positioned them as “unified management solutions” — only to later withdraw that capability or allow it to atrophy.

Complete Management

The holy grail of optimized, business-driven management is the complete integration of storage management, network resource management, and security management into a comprehensive enterprise systems management solution. This will provide for optimum alignment of resources with business goals by allowing all management functions and, therefore, the resources they manage to work seamlessly together. Data access management and data security are intimately involved with the processes and technology of data storage management. Only by integrating these into a comprehensive solution can optimum performance be achieved across the board.

A fully integrated management solution will provide a single point of control. This, in turn, simplifies the process of managing resources and improves efficiency across the board. Personnel requirements are reduced, as well — more efficient management means that fewer personnel can accomplish more with less effort and with reduced likelihood of errors. Less complexity means that personnel do not require an extensive

and unique skill-set to perform their tasks, and those new personnel face an easier learning curve.

With the management of network resources optimized your staff can concentrate on the business of business knowing that, whatever their requirements, your IT infrastructure can be tasked to handle it efficiently and in a manner transparent to the business users.

Intelligent Storage Management

Intelligent Storage Management is the term we use to describe the process of optimally aligning a storage management solution with *your* business needs.

An effective Intelligent Storage Management solution must meet several requirements.

- **Operational efficiency** — The solution must reduce management complexity, and therefore management cost, by improving the efficiency of data storage management.
- **Risk management** — The solution must minimize risk by ensuring business continuity and meeting disaster recovery requirements.
- **Compliance and governance** — The solution must help you comply with government and industry regulations as well as corporate policies regarding data retention, accessibility, and security.
- **Business flexibility** — The solution must enable effective business change management, ensuring that your storage management capabilities can efficiently grow and expand as needed to meet changing business requirements.
- **Security management** — The solution must deliver effective security across the entire enterprise storage management infrastructure. Data security entails both data integrity (ensuring that the data itself is protected from loss or damage) and access security (ensuring that only authorized entities have access to the data).
- **Investment protection** — The solution must help you minimize future costs by building on prior investments and eliminating the need to replace current IT infrastructure. This is achieved by helping you get the most from your legacy data storage equipment by efficiently integrating it into your current data storage solution.

Storage Management Solutions

A general caveat for anyone considering a storage management solution is that the ideal of a “unified solution” has been taken up as a messaging buzzword by storage vendors of every stripe. In many cases it is a false coinage. It is worthwhile examining the types of storage management discussed in the previous section with an eye to how well-suited they are to achieving the criteria of Intelligent Storage Management.

Point solutions — Point solutions fall the furthest short of achieving this objective. Even when your current data storage hardware is all from a single vendor, a point solution locks you into buying hardware solely from that vendor. Not only does this severely

limit your future options and flexibility, but frequently not even products offered by a single vendor work well together.

Watch out, too, for point solutions masquerading as a unified management solution. This a solution where a vendor has incorporated some support for other vendors' products into their management interface, positioning this as a fully unified solution. Frequently their support for competitors' products is severely limited, and that support is subject to the whims of the vendor — whose incentive to continue providing effective support for hardware sold by competitors could prove variable or short-lived — and the continued partnership between the vendors.

Unified storage management solutions — A unified storage management solution is the type of approach best suited to an Intelligent Storage Management solution. A solution whose main purpose is to enable heterogeneous devices to work together must itself be efficiently designed so that all of its components operate well together.

Application suites — A well-architected applications suite, where all the applications of which it consists are designed to work together, can approach the effectiveness of a unified solution. The critical factor here is the vision and capabilities of the vendor who offers and supports it. If the vendor is working toward a unified solution, they will be properly focused on the big picture and not lose sight of the fact that all applications in the suite must, first and foremost, integrate and work well together. If the vendor has sufficient resources and ability to follow through, the application suite will ultimately evolve into a fully unified solution.

As in point solutions, however, vendors selling application suites will masquerade poorly cobbled-together products as unified products, with little regard for whether they are truly integrated in any deep sense, beyond a simple merged interface menu. In reality, these are inconsistent collections of separate products with little or no integration and questionable or uneven functionality.

Computer Associates Intelligent Storage Management Solution

Computer Associates (CA) views Intelligent Storage Management as a four step process.

1. **Identifying** your assets applications, and the information that resides in your storage infrastructure. Assets include data storage hardware, servers, and the applications that use them.
2. **Classifying** information based upon its importance, how it was created, and how critical it is to your business processes.

3. **Defining** the information and the structure of its supporting environment. This includes defining the access and security requirements for your data and establishing a consistent set of policies for managing your data based upon those requirements.
4. **Automating** the defined policies and procedural requirements so that the required actions can be executed in a consistent and repeatable fashion in order to increase productivity and minimize the risk of human error.

CA's response to the need for an Intelligent Storage Management Solution is the BrightStor Storage Management line of products, which integrate as components into a complete storage management solution to meet the needs of a variety of organizations. The following subsection describes these offerings in greater detail.

The BrightStor Storage Management Solution

The BrightStor® Storage Management solution is made up of six key products: BrightStor® Storage Command Center, BrightStor® Storage Resource Manager, BrightStor® SAN Designer, BrightStor® SAN Manager, BrightStor® Process Automation Manager, and BrightStor® Hierarchical Storage Manager (BrightStor HSM). All are designed to work together seamlessly to provide a unified Intelligent Storage Management Solution.

BrightStor Storage Command Center

BrightStor Storage Command Center (BrightStor SCC) provides a single interface for all of your data storage management and reporting functions. The BrightStor SCC dashboard gives you easy access to all of the intelligence you need about the core elements of your data infrastructure from a business point of view.

BrightStor Storage Resource Manager (BrightStor SRM)

The BrightStor Storage Resource Manager (BrightStor SRM) is a cross-platform solution that provides management, monitoring, reporting, and process automation for your entire data storage infrastructure.

The extensive monitoring, reporting, and analysis features of BrightStor SRM enable you to know exactly what your storage management solution is doing at all times and simplify the process of ensuring that your infrastructure is perfectly aligned with your business requirements. BrightStor SRM lets you easily keep track of virtually every important aspect of the entire data storage process — including information about your data and how it is used and about your data storage infrastructure. These monitoring features of BrightStor SRM can automatically notify you when problems occur, and often warn you about impending problems *before* they even happen. In fact, these

analysis features can spot trends and notify you in advance when resources need to be added or reallocated. BrightStor SRM allows you to classify your stored data according to many different attributes, simplifying and in some cases automating the process of determining the business value of specific data.

BrightStor SAN Designer

BrightStor SAN Designer streamlines the often-complex process of planning, implementing, and configuring storage networks. Storage professionals can achieve better results with less effort and a higher level of confidence. BrightStor SAN Designer provides device characterization libraries, design rules, and best practices that make the design process more efficient and effective. It allows storage professionals to try various what-if scenarios and automatically checks for interoperability issues. BrightStor SAN Designer even helps with documenting the results, and provides a visual representation of the entire storage network.

By simplifying the technical issues involved in the design and implementation of a storage network, BrightStor SAN Designer makes it easier to ensure that the results are properly aligned with the business needs of your organization. BrightStor SAN Designer also exchanges data directly with BrightStor SAN Manager.

BrightStor SAN Manager

BrightStor SAN Manager is a unique storage network management solution, designed from the ground up to simplify the complex management of storage network resources and help you maximize their efficient utilization by your business. BrightStor SAN Manager provides real-time discovery, health monitoring, and visualization of storage network resources. BrightStor SAN Manager enables you to accurately monitor the condition of all your data storage resources and displays the results in unified, easily interpreted format. This makes it easy to keep track of what your SAN is actually doing, and ensure that it stays properly aligned with your business requirements.

BrightStor SAN Manager also enables you to centrally perform many administration and configuration functions, further simplifying the process of SAN management. The tight integration between BrightStor SAN Designer and BrightStor SAN Manager ensures that the planning phase of your storage network will move seamlessly into the operational phase, again helping ensure that your technology begins and *stays* aligned with your business processes.

BrightStor Process Automation Manager

BrightStor Process Automation Manager offers a sophisticated yet simple tool for defining, creating, and executing automated processes. BrightStor Process Automation

Manager lets you create and manage policies and procedures for performing storage administration tasks. Templates can range from manually executed to fully automatic. Manual tasks can be assigned to specific individuals or groups with predefined skill sets, and various safeguards help ensure that that business requirements are being successfully met and policies are being followed. Manual processes can be defined with levels of interaction that vary from sending a simple e-mail notification upon completion to requiring authorization before and verification after each step is performed, and the intelligent queue helps avoid wasteful duplication of effort.

Of course, BrightStor Process Automation Manager integrates seamlessly with the other products in the BrightStor Intelligent Storage Management solution.

BrightStor HSM

BrightStor Hierarchical Storage Management (BrightStor HSM) helps optimize the utilization of storage resources by automatically migrating stored data between various tiers of storage devices based upon determined policies. For example, seldom-used files can be migrated to lower-cost but slower hardware devices, while frequently used information can be maintained on faster but more costly equipment. This allows continuous access to all of your data while aligning storage hardware utilization with the business requirements that you define.

Toward a Complete Management Solution

In its BrightStor® line of products, Computer Associates offers storage management and data availability solutions that are each intelligently designed in their own right, but that also offer deep integration across the entire BrightStor line. This is in keeping with CA's vision of intelligent storage management that also strives for ultimate management of data security and infrastructure in a fully unified product.

Large businesses must consolidate management and gain a greater level of control over increasingly complex IT environments in order to maximize IT staff productivity and orchestrate diverse resources throughout the organization. Unicenter® products — Computer Associate's flagship family of modular, integrated management solutions — provides a core set of robust distributed services and an intuitive GUI to any management function that integrates into its framework — including BrightStor storage management products.

Unicenter products deliver IT as a service mapped to business requirements and goals, provides policy-based automation for infrastructure management, and enables data transparency throughout the enterprise with role-based visualization, providing information tailored to the appropriate recipients at the appropriate times.

Unicenter products provide true value for customers with management applications that integrate into an overall framework; such applications include security, scheduling, data storage, and data protection. BrightStor products integrate with Unicenter products for enterprise-wide discovery, monitoring, and management. Integration with Unicenter® Network and Systems Management provides efficient workload management for Unicenter and BrightStor environments.

The BrightStor line of products also integrates with Computer Associate's *eTrust*® security management solutions. This delivers a holistic approach to business security management — whatever the business model or organizational structure. *eTrust* products are designed to enable an enterprise to quickly and effectively embrace new opportunities, improve operational efficiencies, reduce costs, and proactively manage threats to physical access and IT security. Its three solution areas — *eTrust*® Identity and Access Management, *eTrust*® Threat Management and *eTrust*® Security Information Management — are brought together with unified visualization and management through *eTrust*® Security Command Center.

The scanning and curing components of *eTrust*® Antivirus, Computer Associates' anti-virus solution, are integrated into the BrightStor environment, giving administrators the option of having BrightStor products detect, isolate, and remove harmful files from storage-related operations without a separate virus protection solution.

Conclusions

Storage management can play a critical role in the efficiency of your IT infrastructure and the profitability of your enterprise. Every year more and more data needs to be stored and managed. Both the requirements and the available data storage hardware options are increasing in complexity as well. An effective storage management solution can help control the complexity, improve your bottom line, and reduce your risk exposure.

An effective storage management solution can improve your bottom line by:

- Ensuring that your data can be accessed efficiently and reliably.
- Reducing the management costs associated with data storage.
- Optimizing your utilization of existing hardware and minimizing the need for investments in new hardware.

An effective storage management solution can also reduce your exposure to risks and problems, by:

- Ensuring that your data is always readily or reasonably available (depending on your business needs).
- Optimizing management efficiency and reducing management complexity – thereby reducing the likelihood of problems occurring and simplifying the remediation of problems if and when they do occur.
- Ensuring that your data is safe from loss, corruption, and unauthorized access

An ineffective data storage management solution can leave you with a complex, virtually unmanageable data storage infrastructure – one that increases your operating costs due to inefficiency, fails to protect the investment you have in your valuable data, and exposes you to all sorts of risks.

The only truly effective data storage management solution is an Intelligent Storage Management solution – and the best Intelligent Storage Management solution is the one designed and offered by Computer Associates.