

WHITE PAPER

Striving for Innovation and Efficiency in Information Management with Services Oriented Storage Solutions

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IDC OPINION

IT infrastructure is the critical facilitator of the modern extended enterprise, enabling business processes and decision making and fueling organizational growth with new markets and products. IT continues to fuel an explosion of collaboration, communication, and new business models in what may come to be viewed as a golden age of global innovation.

Many IT organizations, after years of stretching existing investments, continue to struggle to meet this rising tide of increasing demands with highly constrained resources. For business and IT leaders, the imperative remains clear: Rationalize the redundancy in applications and you can rationalize IT infrastructure. A services oriented IT infrastructure delivers a business and technological framework that responds more quickly to business and technological change while also providing an internal road map for ferreting out duplication and low utilization of resources.

Hitachi's Services Oriented Storage Solutions (SOSS) are designed to better manage rapidly expanding IT infrastructures and allow organizations to achieve maximum efficiency and benefit from their IT investments. This white paper examines the business dynamics that are shaping the need for services oriented storage solutions and discusses the specific solution put forth by Hitachi.

THE ONGOING BATTLE TO ALIGN IT AND BUSINESS

IT infrastructure (connectivity, storage, and processing) is the critical facilitator of the modern extended enterprise, driving an explosion of collaboration, communication, and new business models in what may come to be viewed as a golden age of global innovation. IT enables better business processes and faster decision making, fueling organizational growth with entry into new markets and new product introductions. As is almost always the case, however, the benefits, the opportunities, and the innovation bring new problems and challenges.

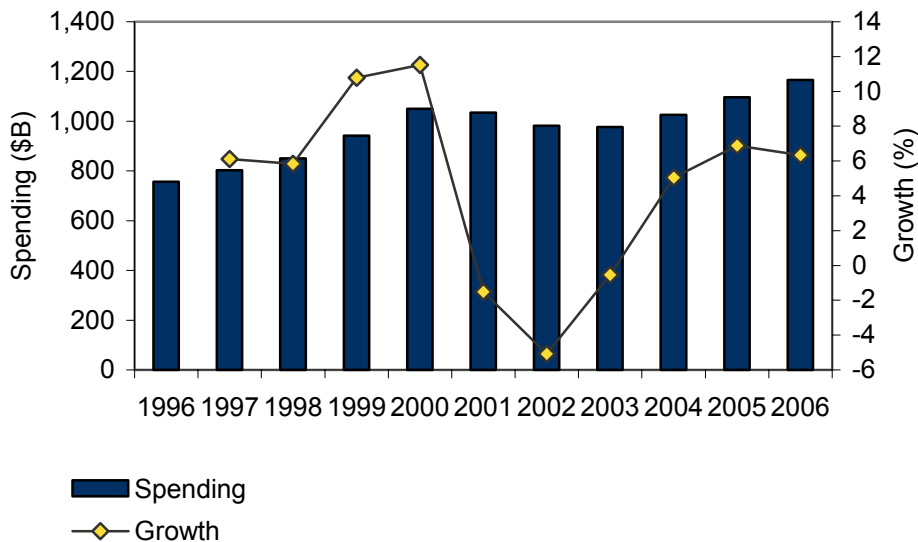
Managing Waves of IT Investments

Business and IT leaders challenged to design, acquire, install, secure, and operate IT infrastructure have witnessed IT spending explode from \$757 billion in 1996 to \$1.166 trillion in 2006. The growth has occurred within several multiyear phases (see Figure 1):

- ☒ From 1996 through 1998, most Global 2000 organizations revamped their enterprise IT application portfolios and related infrastructure with new enterprise resource planning (ERP) suites. These applications linked many departments and reached through firewalls to connect with suppliers, logistics partners, and customers.
- ☒ With this revolution barely complete, the Internet exploded into full view in 1998 with the dot-com boom and the related rush to all things online. Investments in new applications for collaboration, ecommerce, and "Web" presence drove another wave of IT buildout.
- ☒ By 2002, economic and political factors forced a broad retrenchment, and for the past four years, the challenge has been one of consolidating, solidifying, and streamlining both IT organizations and the IT spending that enabled so much of the innovation and revolution.

FIGURE 1

Worldwide IT Spending, 1996–2006



Source: IDC, 2007

Today, business conditions, while always uncertain, are much improved in many industries and geographies. Business leaders, responding to both the challenge and demand for growth, look to new markets, new products, and new processes to underwrite and expand their operations.

Nor has time stood still for the IT infrastructure. New regulatory requirements, steadily growing transaction volumes, new applications, and demands to enable revenue growth have all contributed to an escalating technology management leadership challenge. Many IT organizations, after years of stretching existing investments, continue to struggle to meet this rising tide of increasing demands with highly constrained resources.

What's Wrong With IT?

When working with business executives and business unit managers over the past year, IDC continued to hear the same chorus of criticism leveled at IT leadership, but at a higher volume. For example:

- ☒ IT is too expensive and too little of the IT budget is spent on new projects, with 80% or more of total funding typically spent on maintaining existing functionality.
- ☒ IT organizations are too slow to meet the needs of the business for innovation and change.

Too often, the comments did not go past this list of outcomes and ask the more subtle question: How and why do IT organizations face this challenge? In IDC's view, three major factors are driving the "80% dilemma" and the responsiveness challenge:

- ☒ **Mergers and acquisitions.** When companies combine, especially large companies, they have a tendency to pick and choose from each portfolio. In a theoretical banking merger, one bank might contribute the branch banking system, the other bank might contribute the trust department system, and the Internet banking portal might have been retained from a prior acquisition. The choices are made for complicated reasons, many beyond the scope of IT. In most cases, the outcome is the same: redundancy and overlap in applications and storage infrastructure. Redundancy might occur with the duplication of the credit-scoring engine, a database, or the foreign currency exchange process. Often it amounts to 30% or more of the function points within each application and makes the process of recovering the entire system very expensive and complex.
- ☒ **Application design.** Applications from many software vendors have their own histories and limitations that include and require additional redundant infrastructure; for example, a service desk product that requires its own proprietary database engine or uses its own data replication facility. For vendors striving to achieve their own business success, the expedience of shipping a product that contains or requires redundant infrastructure is often explained as a necessary compromise to achieve a product ship date. In some cases, as much as 40% of the infrastructure required by certain large applications is redundant. In addition, the need for different data management tools for each application adds considerable cost and risk to data protection efforts.

☒ **New project process.** If a new complex application is created or too many changes to an existing application are made, the likelihood of project success declines dramatically. Many companies report failure rates of 30% to 50% for large projects. Faced with these odds and the pressing demands from a business unit to meet a market opportunity window with quick delivery, companies are designing many IT projects to fit in and around existing applications, duplicating functions if necessary, but meeting the all-important targets of "on time" and "on budget." This approach, while meeting the "market window," creates a growing portfolio of small applications that must be maintained and supported "forever," and each application has its own storage assets, backup processes, and archiving systems. This phenomenon also explains why labor accounts for over 50% of a typical IT department's budget: A vast portfolio of special skills must be maintained to support the application portfolio, which is often littered with compromises and redundancies usually made in good faith.

Rationalizing Applications, Yet Again

For business and IT leaders, the imperative remains clear: Rationalize the redundancy in applications and you can rationalize IT infrastructure. This "solution," however, is not new and has been the focus of considerable IT consolidation efforts in past decades.

In the 1960s, the first efforts were made to define a software programming strategy labeled "object-oriented programming" (OOP). In this first iteration, an attempt was made to define software design by encapsulating routines as objects; for example, a software subroutine that sorted a string of values. By combining objects, software designers could radically improve their productivity rather than rewrite routines each time. Unfortunately, it took until the mid-1990s for the idea to evolve from academia into a mainstream technology, at which time a new concept, "Web services," emerged.

The coming of the Internet led to some fundamental reevaluations of IT architectures. Business and IT practitioners quickly recognized that they could more easily combine presentation of information across multilayered IT architectures within companies and across the Internet. While linking complex individual organizational architectures via Internet technologies created more "useful" applications, it often made management of the back-end infrastructure more complex and more fragile.

Web services, delivered via the Internet, represented a new technology strategy for linking systems, and sharing services, but IT organizations needed to adopt new design principles based on an architecture of loosely coupled services to support the shifting requirements of business processes and provide a new conceptual framework for rationalizing IT infrastructure redundancy. The technology framework that evolved to support Web services became known as service oriented architecture (SOA). Since its emergence less than 10 years ago, the term has rapidly evolved.

Taking a Service Approach to Application Rationalization

Today, an SOA is an architecture that relies upon a service orientation as its fundamental design principle. Resources, in the form of services, are made available individually and can be accessed without knowledge about the underlying technology/platform implementation.

In the earlier example of the two banks brought together by a business merger, the credit scoring system might be sourced from an external supplier as a service and connected to the enterprise infrastructure via a secure Internet link. Typically, these services would use well-established standards. The credit-scoring engine would be available to the multiple applications within the infrastructure whenever they required it. The interaction between service and internal applications would be carefully defined by a set of industry and internal standards.

This example highlights many of the key concepts of an SOA: reuse, granularity, modularity, componentization, and interoperability — all framed and defined within a standards framework.

Extending the Service Approach to the Entire Business

Initially created as a strategy for systems interoperability, SOA is now a business and technology framework for describing how systems, technology platforms, and even organizations will interoperate in an increasingly modular and focused world.

From the business user's perspective, the opportunities and risks of the increasingly transparent global economy are clear. Growth is the imperative. Standing still and living with single-digit growth are not options.

The risks are more complex. Companies face economic risks in the form of inadequate resources to expand and invest. They also face rising energy costs as well as volatility in interest rates and commodity prices. Political risks such as terrorism and evolving regulatory standards require the allocation of additional resources for disaster recovery and compliance but add little or nothing from a competitive perspective.

Depending on the industry and the participant, the primary options for dealing with the widening array of opportunities and risks are expand, merge, acquire, or partner.

Regardless of which tactic is employed, IT resources will be involved. Whether delivering more transaction capacity, instantiating a new business process in software, or implementing a more resilient IT infrastructure to support more direct online interactions, business innovation is inextricably linked to the facilitation of business processes and the seamless expansion of the underlying IT infrastructure. The path to business growth leads directly through the IT infrastructure — whether it is owned, leased, outsourced, or supplied as a service.

A SERVICE APPROACH TO ALIGNING BUSINESS AND IT INFRASTRUCTURE

For a company to achieve its business objectives, the CIO and the IT team must make a series of short-, medium-, and long-term decisions that will dramatically affect their department's and their company's ability to seize new business opportunities and control exposure to business risks.

These decisions need to address the classic complaints about the IT organization:

- Poor alignment with the business
- Poor reputation as a business partner within its own organizations
- Inability to deliver high-value projects within the market window
- Staffing issues, including high turnover and low morale
- Proposed solutions that cost too much and deliver too little

Today, another problem is also brewing: concerns about datacenter capacity limitations in the form of space, power, and cooling. This datacenter problem rises above the normal business dialogue to an enterprise issue because of the capital investment required to fix it. In a number of cases, companies have reported that building a new datacenter would cost \$150 million or more.

Each of these concerns is a symptom, not a root cause. The root causes are redundancy and proliferation, driven by the factors that are often beyond the control of IT leadership. Redundancy is structurally layered into the IT infrastructure, coupled with monolithic application architectures that require vast investments in infrastructure resources dedicated to their use, although average utilization rates might be lower than 20%.

It is against this backdrop of constrained business realities that companies are looking to SOA and to services oriented IT infrastructure to meet short-term business deliverables and enact fundamental strategic changes in their IT environment.

The impetus for services oriented IT infrastructure is that it enables an infrastructure framework that can be readily reconfigured, selectively sourced (internally or externally), and singularly optimized. SOA and services oriented IT infrastructure promise a business and technological framework that responds more quickly to business and technological change while also providing an internal road map for ferreting out duplication and low utilization of resources.

Building a Services Oriented IT Infrastructure

Traditionally, IT infrastructure was organized and managed around platforms, and each platform had its own applications, servers, storage, and backup/recovery systems. In the 1990s, companies began to use a common network (IP) across all these platforms, but the separation and redundancy in processing and storage remained.

In recent years, companies also began to evaluate server virtualization solutions that enabled them to improve the utilization of their server assets. Already this change is having a dramatic impact on companies' purchases of physical servers. It is also dramatically improving IT departments' responsiveness to business unit demands for new application servers or expanded processing capacity. What once took six weeks to six months to deploy is now often delivered in a week, a day, or even less than four hours.

Concurrently, but perhaps less visibly, major players in the storage industry are also looking for ways to deliver services oriented storage solutions. Such solutions allow IT departments to address a number of growing concerns:

- ☒ The need to boost utilization rates for all storage assets in the face of accelerating data creation and data analysis requirements
- ☒ The need to cost-effectively accommodate a growing array of different data types including both structured and unstructured data
- ☒ The need to improve the timeliness, reliability, and consistency of applications and the data recovery process
- ☒ The need to deliver more automated storage provisioning in support of large-scale server virtualization initiatives

Services oriented storage solutions represent the logical next step in the evolution and maturation of storage solutions. The remainder of this white paper examines the efforts of a leading IT infrastructure supplier, Hitachi, to deliver products built upon a services oriented storage solutions approach. It discusses how such solutions can help companies react more quickly and effectively to current business problems by delivery of IT infrastructure resources with the same granularity, modularity, componentization, and interoperability characteristics as SOA-based applications.

SERVICES ORIENTED STORAGE SOLUTIONS FROM HITACHI

The first step in IDC's examination of Hitachi's services oriented storage solutions efforts is to more fully define the concept. It is a business-centric framework for aligning IT storage resources with constantly changing business requirements. The specific types of services included within a services oriented storage solution include the following:

- ☒ **Definable capacity.** IT managers can nondisruptively allocate and reprovision large pools of storage capacity into virtual volumes or files. These capacity units are tunable along a number of different axes, including data format (e.g., block, file, virtual tape), I/O performance, cost/gigabyte, gigabyte/square foot, and gigabyte/kilowatt/month.

- ☒ **Data movement.** IT managers can nondisruptively and automatically move and/or replicate data from one pool of storage to another for data migration across storage tiers, data protection, data analysis, long-term archiving, or development and testing. This service leverages a broad spectrum of different data movement functions, ranging from synchronous data mirroring through continuous data protection to full point-in-time copies, all administered and monitored through a single, integrated management infrastructure.
- ☒ **Data management.** IT managers can organize and manipulate the location, movement, and retention of data based upon preset policies. These services include business continuity, content management, data deduplication, dynamic archiving, data encryption, and managed data retention for compliance.

Beyond the defined services, a services oriented storage solution needs to have certain characteristics, including:

- ☒ A scalable, flexible, and tunable hardware architecture (which IDC calls a networked storage controller) that can offload functions from application servers and storage arrays while also providing virtualization for elements such as capacity, cache, and network interconnects
- ☒ An ability to support a wide range of heterogeneous storage hardware platforms with different performance, capacity, and price characteristics
- ☒ A common management foundation for monitoring the underlying hardware, provisioning virtual storage pools, coordinating data movement/replication processes, setting value-added data management policies, and (optionally) charging business units based on actual usage

Hitachi's Storage Solutions

Hitachi, the parent company of Hitachi Data Systems, has a long history of developing leading-edge storage systems for large and medium-sized businesses. In response to companies' ever more sophisticated information and data management requirements, Hitachi builds solutions based upon the following tenets:

- ☒ Provide a business-centric framework that enables organizations to closely align IT storage resources with ever-changing business requirements
- ☒ Provide a dynamic, flexible storage services platform that enables customers to optimize storage infrastructure while reducing cost and complexity

The foundation for Hitachi's services oriented storage solutions includes the following Hitachi offerings:

- ☒ Broad portfolio of low-end, midrange, and high-end storage systems that meet customers' needs for reliable and highly available tiered storage options
- ☒ Universal Storage Platform and Network Storage Controller products, which are among the leading products for delivering block-level storage virtualization and common data replication across heterogeneous storage assets

- ☒ File-based solutions (in partnership with BlueArc) that deliver scalable file virtualization and common data replication services for heterogeneous storage assets
- ☒ Content-aware storage that delivers scalable retention and data life-cycle management for the dynamic archiving and enterprise-side search of critical corporate data
- ☒ Suite of storage software, including advanced products for replication, end-to-end performance monitoring, and usage-based chargeback

By leveraging these elements, IT managers can use Hitachi's services oriented storage solutions to change the interaction between IT departments and their business customers. IT managers can shift the emphasis of their discussions from hardware infrastructure issues to the business issues of rapid application deployment/expansion, application availability, and ongoing cost of use.

Challenges: Making Services Oriented IT Infrastructure a Reality

Any effort to implement a services oriented IT infrastructure, whether for storage or other IT assets, must address critical cultural issues such as data ownership and budget allocations. Overcoming these types of "organizational" issues requires "buy-in" from C-level executives and key business stakeholders.

For this group, nothing works better than early and demonstrable success on a more limited scale. Focus on specific application or locations. Create a core team of committed IT staff to ensure early success. This group can then evolve into an operational center of excellence. Key business metrics to focus on are faster responsiveness to new business requirements, improved business continuity, and high levels of customer service.

The other key challenge is to ensure that initial implementations don't limit long-term usefulness. Ultimately, IT virtualization and services oriented storage solutions are long-term architectural decisions. Focus on scalable design and efficient remediation in the early implementations. In addition, make early investments in data classification and life-cycle management with both new and old applications. This effort will accelerate the usefulness of the overall architecture.

Finally, it is critical to remember that the true value of a services oriented storage solution depends upon its use, not just by IT staff, but by business applications themselves. Look for solutions that provide a level of integration between the storage systems and key content-driven applications.

THE LAYERS

Optimized IT infrastructure will continue to drive collaboration and communication, both in existing enterprise organizations and, particularly, in emerging business models. In the extended enterprise environment, IT infrastructure is essential for enabling business processes and decision making. Solutions such as Hitachi's Services Oriented Storage Solutions platform will help expand the value of IT infrastructure, allowing organizations to continue to fine-tune their asset optimization and organizational efficiency.

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