

Transforming Enterprise Storage — A Proactive Approach Pays High Dividends

Analyst: Michael Fisch

Management Summary

The relationship between an enterprise's storage infrastructure and the broader business is like a tandem bicycle. "Business" sits up front, steering and pedaling, and "storage" is in back, just pedaling and helping to push the bicycle forward. They work in unison and the linkage between them is tight. As data keeps pouring in and the enterprise needs to adjust its course to maneuver in turbulent times, a well-aligned, flexible storage infrastructure stays responsive and adaptable.

Admittedly, this is the ideal. The reality in many enterprises is that storage has difficulty keeping up with the business. It is slow to change and more costly than necessary. If an especially painful problem arises, an enterprise might deal with it, but otherwise storage grows in a haphazard manner. If storage were a small IT expense, if data availability were not so critical, and if information access were not such an integral part of modern business, then maybe a reactive approach to storage could be overlooked. But this is not the case. Storage carries an expansive impact on the enterprise. **Therefore, a deliberate and proactive approach to storage deployment, evolution, and management is recommended.** This will contribute to more robust data availability, improved application performance and productivity in support of business operations, and minimized storage costs.

There are fundamentally two steps involved in storage transformation: (1) define storage service levels to meet business requirements and (2) deploy and evolve the storage infrastructure and internal processes to best meet them. Storage service levels are the final output that users experience, akin to a wireless phone service with different plans and service offerings, such as email, voicemail, etc. You the user get to pick and chose the service level you would like. The storage infrastructure and management processes are the means to deliver the service, like the network of wireless towers and back-end software for the service offerings. In short, the storage infrastructure delivers storage service levels to meet the requirements of the business.

Storage service levels are not determined in isolation, but in the broader context of enterprise objectives and priorities, business processes, and application requirements. Moreover, the storage infrastructure is not just about meeting today's service-level requirements, but also continually improving both performance and cost by leveraging innovations in the storage industry. **This requires an understanding of both your enterprise's organizational processes and how storage technology is evolving.** A proactive approach to storage transformation pays high dividends. Read on for details.

IN THIS ISSUE

➤ Storage Is Business.....	2
➤ Defining Storage Service Levels to Meet Business Requirements.....	3
➤ Transforming the Infrastructure	3
➤ Enterprise Benefits	6
➤ Conclusion	7

Storage Is Business

Viewed properly, storage is not primarily a technical issue. It is a business issue with technical underpinnings. Storage contains, protects, and provides access to an enterprise's precious information. Like a pillar under a roof, it supports IT applications and business processes in the attainment of enterprise objectives. *Exhibit 1 below shows the relationship between storage and the overall business context.*

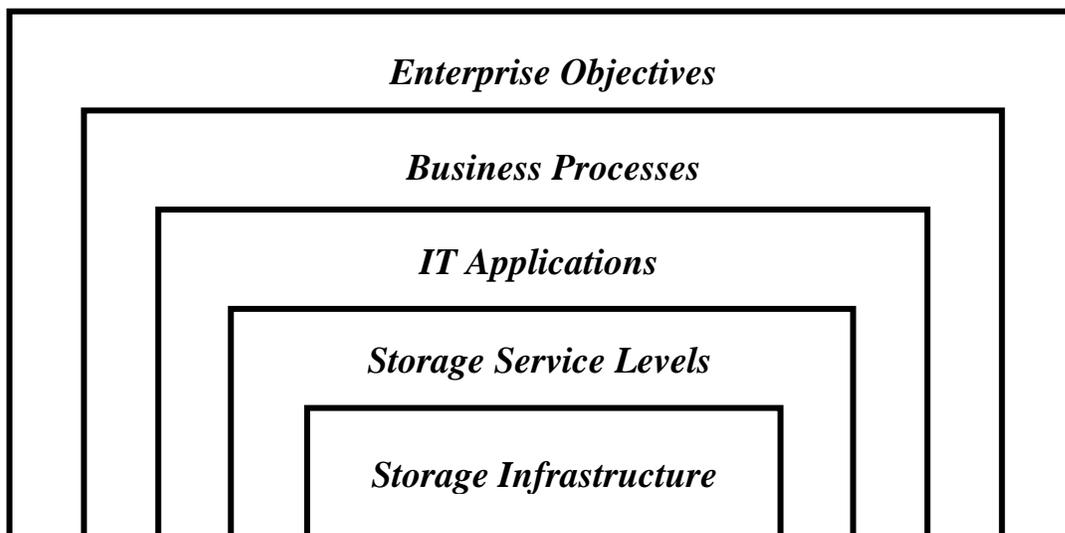
The starting point is the outer layer of the onion – *enterprise objectives*. These define the purpose of an enterprise and include goals like customer satisfaction, profitability, and growth. They are what the board of directors and corporate executives are most concerned about achieving. **Enterprise objectives are the end, and everything else is the means.** In the next layer are *business processes*, which flow through and across functional areas like manufacturing, accounting, finance, human resources, sales, and marketing. Consistent execution of business processes is what delivers the enterprise objectives. In turn, these processes rely on *IT applications*, which may support specific processes, like order processing, or the enterprise in general, like e-mail or content management.

Applications require access to storage with appropriate *storage service levels*, which express different qualities of service (e.g., performance, cost, etc.). Finally, it is the *storage infrastructure* (hardware, software, management processes) that delivers the various service levels.

In this model, the dependencies for execution flow from bottom-up. That is, enterprise objectives cannot be achieved without the proper function of the systems and processes beneath. At the same time, the requirements of systems and processes are determined from the top-down. So, it is the priorities set by enterprise objectives that ultimately determine the type of storage system to deploy.

The key to successful storage transformation is to make the logical link between enterprise objectives and the storage infrastructure. This is a process of defining the relationships and cause-and-effect linkages from top to bottom and allowing the business context to shape storage. Business and IT should be involved in this process because both are stakeholders with valuable input. Functional personnel have the best sense for what the business processes need, and the IT department knows best what technology can do.

Exhibit 1 - Storage in Business Context



Defining Storage Service Levels to Meet Business Requirements

In the storage arena, the common ground where business and IT come together is the storage service level. More generally referred to as a service level agreement (SLA), it is essentially a contract that specifies characteristics of a service. Business knows what it is getting for its money, and IT knows what it is responsible to deliver.

Definition

A storage service level includes characteristics such as:

- Capacity,
- Performance,
- Availability,
- Recoverability¹,
- Archiving and data retention policies, and
- Cost.

A service level is applied to a particular data set. For instance, an e-mail application uses a storage service level with mid-range performance, availability, and cost characteristics. To comply with regulatory requirements, it also indexes and archives messages for a period of years. Furthermore, an application may also take advantage of multiple service levels. A file server, for example, could migrate inactive files to a low-cost ATA disk array to save on storage costs.

Information Lifecycle Management

Both archiving and file migration are examples of Information Lifecycle Management (ILM), which is a strategy for aligning storage resources to information as its value changes over

¹ Availability expresses the percentage of time that a storage resource is accessible, such as 99.99%. Recoverability expresses how quickly and fully the resource can be restored after a failure. It includes degree of restoration (recovery point objective) and allowable time to restore (recovery time objective).

time.² Business processes, timing, regulations, audits, lawsuits, and so forth affect the value of data and, therefore, how it should be treated. **ILM takes a cradle-to-grave view of information and strikes the optimal balance between meeting business requirements and minimizing storage total cost of ownership.**

Process

A stepwise process for classifying data and specifying storage service levels is as follows:

1. Define business processes and priorities in light of enterprise objectives.
2. Map IT applications to business processes.
3. Classify data according to its business value.
4. Define service level tiers to contain the classes of data.

The process can be iterative. For example, users of an application may prefer the highest service level but willing to settle for a mid-level one when faced with the cost.

Transforming the Infrastructure

With storage service level requirements in hand, the next step is to transform the storage infrastructure to best meet them. It involves storage hardware and software as well as associated management processes. This is also not a one-time event, but an ongoing process to improve service levels and reduce costs as the underlying storage technologies and practices improve. It requires an understanding of internal requirements – as crystallized in storage service levels – and a general understanding of how storage technology is evolving. *Exhibit 2 below describes the evolution of information storage in terms of both technical and business/organizational*

² See *Tiered Storage Classes Save Money – Getting The Most Out Of Your Storage Infrastructure* in **The Clipper Group Explorer** dated August 29, 2002, at <http://www.clipper.com/research/TCG2002030.pdf>.

characteristics.

An enterprise may be at a certain phase in the evolution – traditional direct-attached, basic networked storage, or even having some characteristics of storage as a service. It may also fall somewhere in between. Storage as a service, as characterized below, represents where storage is headed. It is both an ideal and a practical reality at the same time. That is, the objective for enterprises is not arriving (as if IT will ever

“arrive”), so much as it is making progress and steadily approaching the ideal.

Storage transformation is a matter of keeping one eye on business requirements and the other on evolving the infrastructure. There are real economic and business benefits to doing this well (see below). So, how can an enterprise move forward? Rome was *not* built in a day, and neither is an infrastructure that delivers storage as a true service. It represents a

Exhibit 2 - Evolution Phases of Information Storage Evolution

	TRADITIONAL DIRECT-ATTACHED	BASIC NETWORKED STORAGE	STORAGE AS A SERVICE
Technical Attributes			
Method of Provisioning	Box-oriented	Service focus, but lacking metrics and granularity	Multiple, measured tiers of service – data storage service levels
Degree of Consolidation	Proliferation of direct-attached “storage islands”	Physical consolidation – larger, shareable units	Logical consolidation – single virtualized “pool”
Centralization of Management	Point utilities, minimal or no integration	General management console + point utilities, some integration	Single management console for enterprise-wide, heterogeneous infrastructure
Automation	Manual administration (e.g., Excel spreadsheets)	Manual initiation and change via partly-automated tasks	Full policy-based automation, minimal human intervention
Adaptability	Labor-intensive change management – hardware and software resources dedicated to applications and departments	Less difficult to change due to networked connectivity, though resources still dedicated	Dynamic capacity allocation and data movement among service-level tiers
Business/Organizational Attributes			
IT function within the organizational structure	Distributed or partially centralized, departmental	Mostly centralized	Centralized enterprise-wide
Accountability	Business demands the best service, IT supposed to deliver regardless of cost implications	Business demands the best service, IT accountable for cost-effective delivery	Business accountable for consumption, provider accountable for SLAs delivering service levels
Alignment between IT and Business	Haphazard	Enhanced but indiscriminate – “one or two sizes fit all”	Optimized – right balance of performance, availability, and cost for the right data at the right time
Total Cost of Ownership	Highest	Medium	Lowest

major renovation of both technology and management process. So, the best approach in most cases is to take one step at a time, demonstrate tangible progress through a series of successful projects, and keep moving forward as needs dictate and resources allow. It is a long-term journey with milestones along the way.

Following are some salient steps to take in the process of storage transformation:

- **Assess your enterprise storage profile.** Where is your enterprise in the phases of information storage described above? What are the service level requirements of your business?
- **Make a plan to improve the technical infrastructure and management procedures.** This will mean phasing in advanced characteristics – like a networked, tiered infrastructure, virtualization, centralized management, policy-based automation, flexibility, and the ability to provision capacity as measured, tiered services – as appropriate and as technology allows. Start with low-hanging fruit, places where you can get faster, larger returns.
- **Consider engaging professional services.** It may be beneficial to enlist professional services to assist with your storage transformation. Technology is only part of the equation, and third-party services can bring a level of business process and integration expertise to bear that you may not have internally. Finding a partner with proven methodologies and deliverables can speed deployment while mitigating risk. Consider a provider with:
 1. Specific expertise in information management as well as storage infrastructure,
 2. A demonstrated history of success (e.g., references), and
 3. The ability to assess requirements, deploy assets, manage on an ongoing basis, train your staff, and even outsource, if needed.

- **Establish a centralized storage (IT) function.** It may take some time to do this if you are starting with distributed or decentralized function, where each department or subgroup buys and manages its own equipment. People may be used to doing it this way, even though it results in poor economics and possibly inadequate service levels. The challenge is to encourage the departments to cede control to a central IT department, which is a political and cultural issue as much as technical.
- **Make storage service levels the basis of accountability for consumption and delivery of IT services.** Again, this is the common ground and pivot point between business and IT.
- **Pick the right vendor(s).** Vendor choice is a commitment, of sorts, that influences how your enterprise will build and evolve the infrastructure in the future. *Is the vendor/ supplier committed to storage as a service? Will it develop and enhance its products to help enable this vision over time? Will it partner with you in the journey?* These are important questions since your final destination is known only in general terms, and you must rely on these vendors to help take you there. Trust, credibility, a solid track record, good products and professional services, and a sensible, open vision are important considerations.
- **Pay the most attention to software selection, especially storage and data management software.** Software is the capstone of a storage utility because it holds everything together. It directs, manages, and adds value to the underlying hardware assets. It also has the largest impact on operating costs, which are by far the largest component of storage total cost of ownership (TCO).

Enterprise Benefits

Enterprises can benefit from a smart, proactive approach to storage transformation in several ways:

- Lower storage TCO,
- Better alignment between storage and the broader enterprise,
- Greater adaptability, and
- A higher likelihood of meeting enterprise objectives.

Lower Storage TCO

First, an infrastructure with utility characteristics lowers acquisition costs by using assets more efficiently. For instance, enterprises typically utilize only 30 - 40% of their storage capacity, but there is no reason it could not be upwards of 80%, if it was virtualized, networked, and smartly managed. Moving from 40% to 80% utilization would cut storage hardware costs in half. Extrapolate this same dynamic over servers, software, and networking, and it becomes clear how utility computing can take a bite out of acquisition costs by improving utilization. But the procurement savings do not stop there. Tiered service levels also deliver storage to users and applications more precisely. The disciplines of accountability and establishing service levels help define what the individual needs are. **Giving everyone exactly what they require – no more and no less – avoids blanketing a group of users or applications with a higher service level than all of them need and overspending on IT.** Precision cuts out wastefulness.

Secondly, an infrastructure that delivers storage as a service lowers operating costs primarily by simplifying management. This component of storage TCO adds up to many times the cost of acquisition over the useful life of a storage asset. Through centralized management, virtualization of heterogeneous resources, and automation, a storage utility dramatically raises the productivity of each administrator, and so lowers management costs. It also makes the job of an administrator more interesting by automating many of the repetitive, boring tasks, freeing them to work on more strategic and complex tasks.

Furthermore, since utilization levels are

higher, there is less equipment to manage – a sort of virtuous circle. There are also fewer environmental expenses like power, cooling, and floor space, which can add up over the lifetime of a hardware asset.

Better Alignment Between Storage and the Broader Enterprise

The impact of IT on an enterprise is a function of the technology itself, how well it is managed, and its linkage with the business processes. Storage as a service gets all the wood behind the arrow, so to speak, by delivering precisely the right services in the right amounts at the right time in the right place. No more blanket, indiscriminate coverage or one-size-fits-all service. No more inadequate support of important applications, either, which negatively impacts the productivity of the associated business processes. Applying high performance and reliability in the right places raises the net effectiveness of the whole infrastructure. For instance, if a critical application requires the highest degree of protection and recoverability, such as remote mirroring with nearly instantaneous failover, it can receive this service while other applications get a less-sophisticated and more cost-effective alternative. **A storage-as-a-service approach strikes the optimal balance between business demands and cost.**

Greater Adaptability

Going back to the tandem bicycle analogy, a storage infrastructure that is well-aligned and tightly-integrated with the business helps an enterprise be more responsive. This adaptability is found in the ability to virtualize, centrally manage, and dynamically provision and reallocate resources. **Storage ought to be a pivot point that, when liberated, allows the enterprise to respond more quickly to changing market and competitive conditions.**

A Greater Likelihood of Meeting Enterprise Objectives

By more effectively supporting the business processes that achieve enterprise

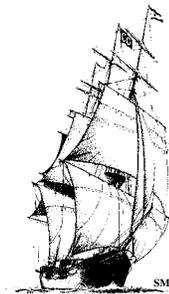
objectives, storage can have an impact on the bottom line. Part of the support comes from more precise application of service levels; part comes from shaving out costs; and part comes from better availability, recoverability, and performance of enterprise applications.

At the same time, one must be careful not to over promise here. IT is not a cure-all, and it should not be thoughtlessly thrown at business problems. While it is a major and growing piece of the commercial puzzle, it is still one of many that must fit together seamlessly to deliver on enterprise objectives. IT cannot compensate for a lack in vision, tactics, human talent, or financial resources, but it can accelerate and magnify the impact of all of them, if done properly. **Storage transformation is about making IT more effective so the business can be more effective.**

Conclusion

Enterprises can use every advantage in the fast-paced, competitive, global marketplace. **Storage transformation creates an effective, symbiotic linkage between storage and the business.** Its impact is felt in economic terms, in helping achieve enterprise objectives, and in greater adaptability.

To do it, you have to think strategically about storage as a service, involve the appropriate business and IT stakeholders, and don't be afraid to engage third-party services if your enterprise needs help with the process. It is worth taking the time to do it right.



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About the Author

Michael Fisch is Director of Storage and Networking for The Clipper Group. He brings over eight years of experience in the computer industry working in sales, market analysis and positioning, and engineering. Mr. Fisch worked at EMC Corporation as a marketing program manager focused on service providers and as a competitive market analyst. Before that, he worked in international channel development, manufacturing, and technical support at Extended Systems, Inc. Mr. Fisch earned an MBA from Babson College and a Bachelor's degree in electrical engineering from the University of Idaho.

➤ ***Reach Michael Fisch via e-mail at Mike.Fisch@clipper.com or at 781-235-0085 Ext. 25. (Please dial "1-25" when you hear the automated attendant.)***

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