



WHITE PAPER

The Business Value of Dell EqualLogic and Compellent Primary Storage Solutions

Sponsored by: Dell

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Getting the best from a virtualized environment is a vital concern for IT managers struggling to deal with shrinking budgets, fewer staff, and other pressures brought about by the tough financial climate. Capital investment in IT is typically under severe scrutiny at the board level, while business units demand new and better applications as they strive to deliver higher levels of customer service.

IT staff no longer have the time to spend on basic storage management issues just to keep the system running. Load balancing, application optimization, and disk maintenance should be devolved to the array where they are managed automatically.

Dell has stepped up to the challenge with primary storage platforms based on its Fluid Data architecture, so that data is automatically moved to the most cost-effective location, thereby optimizing data throughout the infrastructure.

To quantify the business value of the Dell EqualLogic and Compellent storage systems, IDC interviewed ten customers, including five in Europe and five in North America. The average return on investment (ROI) for the Dell storage solutions was 397%, with an average payback period of six months from deployment.

In addition to the financial return, IDC found that Dell storage had a positive impact on the IT staff's operational capability. System managers were able to provision more quickly, resulting in more rapid response to business requests, and spent less time 'fire fighting', allowing more time for proactive initiatives that take the company's business forward. IDC also found that application availability was significantly improved, particularly in dynamic environments that were growing rapidly. Despite a 159% average annual data growth rate, organizations were able to increase efficiency of their storage operations to where they can manage twice the storage with the same staff.

IDC believes that automated, self-optimizing and efficient storage platforms such as Dell EqualLogic and Compellent are a financially prudent investment for companies looking for more from their storage infrastructure. In addition, users typically find that the Fluid Data architecture becomes a strategic enabler through more proactive IT staff, consistently high service levels to the users, and greater flexibility to business change.

IN THIS WHITE PAPER

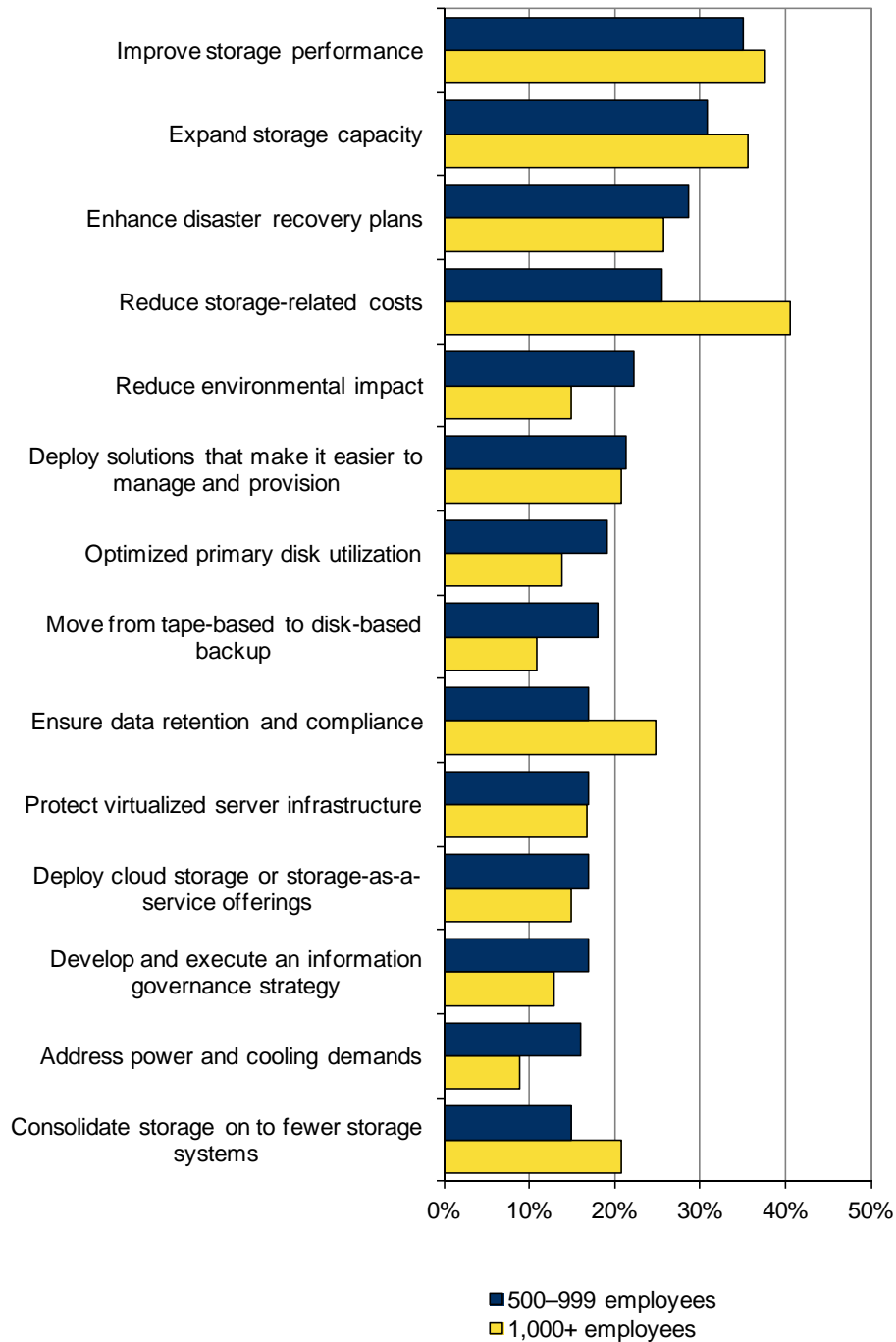
This paper sets out a business value assessment of Dell's EqualLogic and Compellent storage systems in the context of IDC research into the priorities and challenges faced by IT managers looking for midrange and high-end open systems storage solutions.



Users Need Sophistication Without Complexity

FIGURE 1

Top Priorities Relating to Storage for the Next 12 Months



N = 500 (France, Germany, Italy, Spain, U.K., Nordics)

Source: IDC Storage End-user Survey 2012

The pain points are clearly seen when IT managers are asked for their top priorities regarding future storage spending. Three of the top four priorities for companies with 500–999 employees and 1,000+ employees relate to the struggle to manage data volumes that may double in size every 18 to 24 months.

As they plan for the future, many companies are increasingly following larger enterprises in the move towards consolidated, highly virtualized and dynamic architectures in order to boost capability while driving down the cost of doing business. Storage must play its part in facilitating this strategic plan and should ideally exhibit the following characteristics.

- ☒ **Support the business objectives.** During the economic downturn, funding was tight and companies were focused on minimizing capital outlays. As the economic situation in some countries has improved, the priorities shifted markedly as companies looked for ways to deploy new and better services for customers in a bid for market share.
- ☒ **Enable business continuity and disaster recovery.** IDC research shows that improving DR capability is one of the top drivers for storage investment. It is essential that storage systems have efficient recovery points, rapid recovery times and powerful replication capabilities, including synchronous replication that was previously only the preserve of large scale enterprise systems.
- ☒ **More automation.** As much as possible, storage must be self-optimizing, self-managing, and self-healing.
- ☒ **Simpler data migration.** Midsize companies will not countenance the significant migration costs experienced by enterprise companies. It is therefore essential that migration can be conducted in a rapid and transparent manner.
- ☒ **Need to extend the benefit of virtualization into the storage realm.** Storage virtualization transforms physical storage assets into a flexible pool that can be provisioned and reallocated as changing workload demands dictate.
- ☒ **Need to extend the life of legacy storage arrays.** It is no longer acceptable for a company to discard two- or three-year old arrays simply because they lack modern functions such as thin provisioning.
- ☒ **Need for operation and management by non-storage specialists.** An intuitive GUI with configuration wizards and readily accessible support resources is now of more value.
- ☒ **Scalability.** The current market environment demands that transparent scalability is possible in several dimensions. Capacity should increase by adding drives to an array or by adding an array to a virtual pool. I/O throughput should be directly scalable in order to meet the evolving needs of the workloads.
- ☒ **New level of price-performance and reduced whole-life costs.** Storage must respond to the need for lower capital costs, and must also deliver significant operational cost savings throughout its useful life.

Dell Storage System Overview

The business value of Dell's enterprise class storage platforms is delivered in three ways: provide better efficiency, increase IT agility, and achieve operational resiliency. Efficiency is provided through eliminating excessive license fees and forklift upgrades while requiring less hardware to buy and manage. Agility is increased by reducing time-to-provision and freeing up resources to support business innovation, and operational resiliency is achieved with exceptional availability and integrated data protection.

EqualLogic storage

"Uncomplicated and versatile storage for an IT generalist"

Dell's EqualLogic family of storage systems is designed to offer a highly cost effective, seamlessly scalable, and effortless Ethernet networked storage platform for growing virtual and mixed server environments. The ease of use is appreciated by users: "Quite honestly, when we started looking at it, this was one of the things that I really enjoyed about the EqualLogic platform." Its low entry point and scale-out architecture enables customers to buy only what they need and expand later with ease but without disruption. An EqualLogic SAN can start with one array and be scaled-out to a cluster (called a group) containing up to 16 arrays. Multiple generations of arrays with different capabilities can be combined in a group. This allows for mixing storage with various performance and capacity points to match workload needs, and provides investment protection for existing equipment as well as seamless upgrades to new generations of equipment.

Built-in automated management capabilities, like autonomous load-balancing, dynamic tiering, and automated setup for new LUNs, and an easy-to-use interface, lower the administrative overhead associated with legacy storage systems, freeing up valuable time for IT staff. As an IP-specialist storage platform, EqualLogic supports both iSCSI SAN and CIFS/NFS NAS access for unified storage management and storage systems consolidation. All-inclusive pricing for all the data management features, like snapshots or replication, dramatically improves overall TCO, while making budget planning simpler and predictable by eliminating unforeseen licensing costs.

Compellent Storage

"Self-optimized and powerful storage for a storage specialist"

Compellent Storage Center is Dell's enterprisewide storage infrastructure, serving all Fibre Channel, IP SAN, and NAS needs for unified storage management. A Compellent array can scale up to create a large pool of storage managed by a single self-optimizing system. Multiple systems can create a storage grid in the datacenter with live volume migration to support VM motion, fully transparent to the hosts and applications.

In addition, all Storage Center systems can be monitored and managed from a single pane of glass, but the deep integration with virtualization, systems management, and orchestration with vendors ensures that management overheads associated with storage provisioning are kept to a minimum. As one user noted: "I can provision new

storage on a server in less than a minute. Before, to provision, it would take a couple of hours, and it's a task we need to perform twice a week."

A grid infrastructure can span across multiple Storage Center generations, ensuring investment protection and non-disruptive expansion. Built-in enterprise class data protection capabilities like pointer-based snapshots and thin remote replication, coupled with Dell's proactive remote technical support, allow for peace of mind even for the most mission-critical business applications.

TABLE 1

Dell Fluid Data Architecture: Key Storage Management Functions and Associated Business Value

<i>Dell Fluid Data Architecture: Key Functional Characteristic</i>	<i>Functional Characteristic</i>	<i>Business Value Benefit</i>
Reduced technology refresh costs due to extended product life	<p>The storage pool can be extended by adding new arrays or controllers while preserving existing investments.</p> <p>Five-year standard warranty.</p>	<p>Storage can start small and grow over time, reducing over-provisioning.</p> <p>Existing Dell storage (legacy) assets can remain part of the virtualized storage pool, extending their useful life.</p> <p>Array investments can typically be depreciated over five years rather than three.</p> <p>Many of the users interviewed by IDC for this study were still using the original controllers within the storage pool, despite undertaking several upgrade cycles</p> <p>Since forklift upgrades are never required, further savings in professional services fees can be made.</p> <p>No premium levied on service contracts for out of warranty units.</p> <p>Compellent "perpetual" software license does not need renewal if a controller is upgraded.</p> <p>EqualLogic "all inclusive" software licensing means all software features are accessible at no additional charge.</p>
Rapid time to deployment	Performance and capacity can be added without disrupting existing workloads.	This speeds up the ability to deploy new storage capabilities to enable key business initiatives or to support changing workload profiles.

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Automated tiering and data migration	<p>Provides a mechanism to automatically migrate "hotspots" to a higher performing tier within the storage pool.</p> <p>"Cold" data is automatically migrated to lower storage tiers based on lower-cost drive technology.</p> <p>Migration policies can be tailored to suit the needs of different departments within the organization.</p>	<p>Automatic relocation of data to most cost-effective storage tier results in reduced management overheads while cost/performance is continually optimized.</p> <p>The users interviewed for this study found that 70%–80% of data was migrated to the lowest tier using capacity-optimized lower cost drives. Upgrade expense was therefore reduced.</p> <p>This results in more consistent performance in meeting SLA requirements. IDC research shows that manually repositioning data to address performance problems can take days to execute since data must be selected, moved and then monitored to test that the problem has been solved. Automation of the process allows the system to respond correctly to surges in demand without operator intervention.</p> <p>The Compellent Data Progression function and EqualLogic Automated Performance Load Balancer leverage the performance of SSD drives by automatically selecting and positioning data in the SSD layer according to the current workload requirement. Thus, a relatively small quantity of SSD can make a larger positive impact on system performance.</p>
Simplified management	Completely virtualized storage separates the management of storage services from hardware configuration.	<p>Reduces complexity of IT operations. This reduces the need for specialized expertise and minimizes time-consuming, error-prone manual tasks, resulting in lower cost of operations.</p> <p>Staff time is freed up to allow increased focus on understanding and supporting business requirements.</p> <p>Real-time reporting allows users to plan and tier more accurately, further improving efficiency.</p>
Multiple drive type support	Support for SATA and Solid State Drives (SSD)	<p>The ability to optimize the drive price/performance to match the performance and capacity needs of the business.</p> <p>SSD for high-IOPS transactional workloads and high duty-cycle SAS drives for mission-critical applications.</p>
Thin provisioning	The Dell array allocates and uses physical disk capacity only when data is actually written.	<p>Greatly increased storage utilization and reduced stranded capacity. Utilization can rise from a typical 30%–40% to over 70%. Can significantly reduce the amount of physical disk needed.</p> <p>By using disk capacity more efficiently, capacity upgrades can be reduced or deferred.</p> <p>Capacity planning in dynamic environments is greatly simplified, as the physical space allocation always closely matches the real capacity requirement. It is no longer required to estimate the future disk capacity requirement and to pre-allocate capacity.</p> <p>Reduced labor costs due to improved capacity planning capability.</p>

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Support	Proactive 24x7 support service.	<p>Users interviewed by IDC for this study consistently expressed high levels of satisfaction with Dell Compellent Copilot support. In many cases, proactive interventions by Copilot had enhanced uptime, availability, and overall performance.</p> <p>Copilot was repeatedly identified as an invaluable component of the Dell storage proposition. In some cases, Copilot remotely resolved technical issues during the night, with IT staff receiving a resolution report when they arrived in the morning. Users told IDC that Copilot typically allowed them to allocate IT staff resources elsewhere.</p> <p>Significant changes to EqualLogic support will occur later this year, with the release of SAN HQ 2.5, which will begin supporting enhanced diagnostic data gathering: proactively monitor healthy systems, reduce manual steps from entire support cycle where possible, and minimize customer involvement in problem resolution</p>
Business continuity and disaster recovery	<p>Continuous, writeable thin snapshots.</p> <p>Thin replication — Send only changes to data to any storage system.</p>	<p>Enhanced recovery point objectives and recovery time objectives to optimize business continuity service levels leading to reduced downtime costs.</p> <p>Simplified backup management and reduced impact of data protection operations. Backup windows shortened, offload backup processing from production servers.</p> <p>Simplified replication — just clicks to set up. Reduced bandwidth costs. Reduced hardware costs for a replication target system.</p>

Source: IDC, 2011

THE BUSINESS VALUE OUTCOME**Study Demographics**

In spring 2012, IDC interviewed ten organizations that had been using Dell Storage Solutions for several years. The organizations ranged from medium-sized companies with as few as 450 employees to enterprises as large as 10,000 employees. The organizations interviewed are based in Western Europe and North America and include representatives from finance, healthcare, agriculture, education, and government market segments. The interviews were designed to elicit both quantifiable information and anecdotes so that IDC could interpret the full impact of Dell Storage Solutions on the organization. Table 2 offers an aggregated profile of the companies interviewed.

TABLE 2

Demographics

Employees	3,186
IT staff	72
Servers	101.2
Percentage of images virtualized	58%
Storage (in TBs)	482
Annual storage growth	159%
Industries	Education, government, healthcare, manufacturing, media, research
Geographies	Western Europe, North America

Source: IDC, 2012

Selecting Dell Storage Solutions

Most of the organizations selected Dell storage solutions because they were impressed with the flexibility compared to other storage options. Some examples are provided below:

- ☒ **Enterprise features.** "Initially, we were seeking to put in a SAN, with one of our main goals being data replication, since we always have to worry about damages and outages from hurricanes and tropical storms. We chose Compellent primarily because it's very easy to get features into their development cycles and very progressive. It just gives us more options... more tools in the toolbox to figure out different ways to stage applications. And that makes us more agile. I'd say that this translates into better recoverability... more uptime."
- ☒ **Easy management.** "Quite honestly, when we started looking at it, this was one of the things that I really enjoyed about the EqualLogic platform. This was prior to the Dell acquisition, but it certainly holds true today, as well. I was talking to the sales engineer when we were getting ready to try their solution and evaluate it. I asked him what it would take to get an evaluation unit in and test it out. He brought it in and said... there you go... I can certainly walk you through the setup."
- ☒ **Cost-effective.** "We were looking at a storage platform for some of our remote smaller offices for a shared environment for a virtual platform. We were looking at a solution that would enable us to remove the backup tapes in the environment. We were looking for physical-based backup, allowing us to do "snapshotting" and replication to other facilities, as well as being a platform for the virtual environment. We did a "bakeoff" between four different products, including EqualLogic, which had the feature set and was the most cost-effective of all of those solutions."

- ☒ **Data Protection.** "The SAN definitely helps our recovery speed. If we have an application or a service that went down for some other reason, the SAN allows us to make copies and bring stuff up faster than if we had a bunch of standalone boxes. I'd say that the DR speed has increased by at least 50%. And now we can bring something up in one to two hours."
- ☒ **Scalability.** "Some systems are configured where it can only have so many disk chassis, or it can only hold so many disks. Compellent separates its system into different components, and the controllers just hook up to different disk enclosures. If you need more, all you have to do is add more disk enclosures... and there is no set limit."

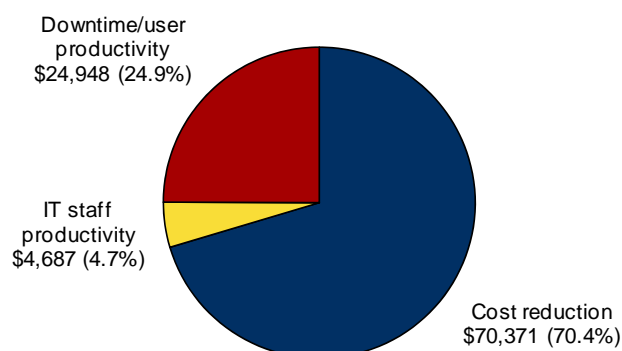
FINANCIAL BENEFITS ANALYSIS

From the interviews, IDC was able to measure the financial impact of Dell Storage Solutions. IDC found that customers in this study achieved benefits in three areas: Storage environment infrastructure cost reduction; IT staff productivity improvement; and increased end user productivity. The aggregate financial benefit experienced by the organizations in this study, as Figure 2 shows, is \$100,005 per 100 end users, per year from the following areas:

- ☒ **Reduced storage environment infrastructure costs.** Dell storage solutions are more efficient and have higher utilization rates and longer productive life spans. Organizations in the study used Dell Storage Solutions to optimize and expand their storage environments, annually saving \$70,371 per 100 users.
- ☒ **Optimized IT staff productivity.** Organizations were able to greatly enhance their ability to proactively manage their storage environments and operations, saving \$4,687 per 100 users per year.
- ☒ **Enhanced end-user productivity.** Organizations in the study were able to reduce storage-related service disruption and provide quicker responses, resulting in 99% improvement in end-user downtime. End-user productivity benefited from reducing downtime and organizations saved on average \$24,948 per 100 users per year.

FIGURE 2

Average Annual Benefits (Per 100 Users)



Source: IDC, 2012

COST REDUCTION

As a result of deploying Dell Storage Solutions, customers in this study have lowered their annual IT expenses for storage by an average of \$70,371 per 100 users (see Figure 3). These savings stem from the following key areas:

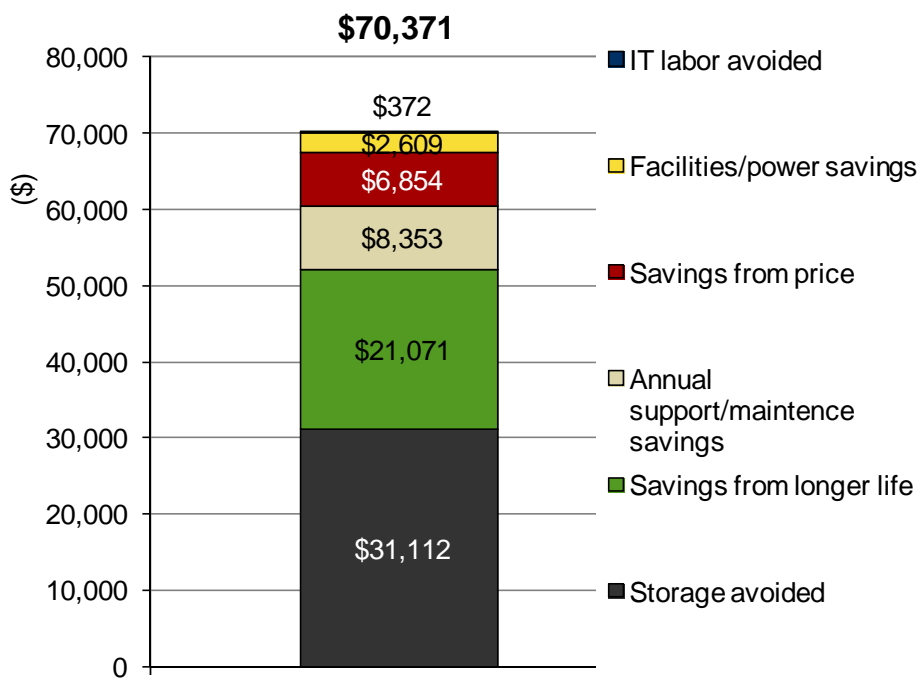
- ☒ **Higher efficiency.** Dell storage solutions are modular and more flexible than frame-based chassis systems. So tiering is much easier; adding or moving storage resources around is easier which increases utilization. Organizations did not have to over resource to meet changing needs. As explained by one Dell customer: "With an EqualLogic platform, it has a pair of controllers and disk with every unit you buy. And so it scales up and out." On average, organizations in the study found Dell storage solutions to be 44% more efficient than other storage solutions they had used.
- ☒ **Longer life.** Compellent installations tended to have a 96% longer productive life span than non-Dell storage solutions. Organizations in the study were replacing Compellent solutions every 6.9 years compared to 3.5 years for their other storage environments.
- ☒ **Greater cost effectiveness.** Dell EqualLogic storage solutions are delivered as a complete solution with all software features enabled. Whereas some competitive storage providers charge additional fees for add-on capabilities as stated by one company, "EqualLogic was cheaper, definitely. The reason it was less expensive is not necessarily the cost of the platform itself, but all of the software on top of the other solutions. For example, if I wanted to do 'snapshotting' with some of the other solutions, I would have to purchase a separate software license for 'snapshotting'. If I wanted to do replication to another facility, there was another license for software for some of the other products. But with EqualLogic, by the time you put it all together in one bundle, it

was 20% cheaper." Dell Compellent, software licenses are "perpetual" in that they do not have to be re-purchased after a controller upgrade.

- ☒ **Lower annual support/maintenance.** By avoiding adding storage at a higher rate, and extending the useful life, annual maintenance costs were reduced by 65%.
- ☒ **Facilities/Power.** By avoiding adding storage at a higher rate, facilities and power costs were reduced by 34%.
- ☒ **IT labor avoided.** Staffing efficiency was a result of Dell Storage Solutions extending the amount of storage it could manage through automated load balancing and simplified management of a virtualized storage pool. So while these organizations were continuing to grow their storage requirements annually at 159% in response to business demands, they did not have to grow their IT staff as much because they were able to create a more efficient storage management operation. Many of the Compellent users emphasized the labor-saving impact made by Dell Copilot support services. Common examples included the proactive supply of parts to fix issues during out-of-hours periods, and the active supervision of system upgrades.

FIGURE 3

Annual Infrastructure Benefits per 100 Users



Source: IDC, 2012

Optimized IT Staff Productivity

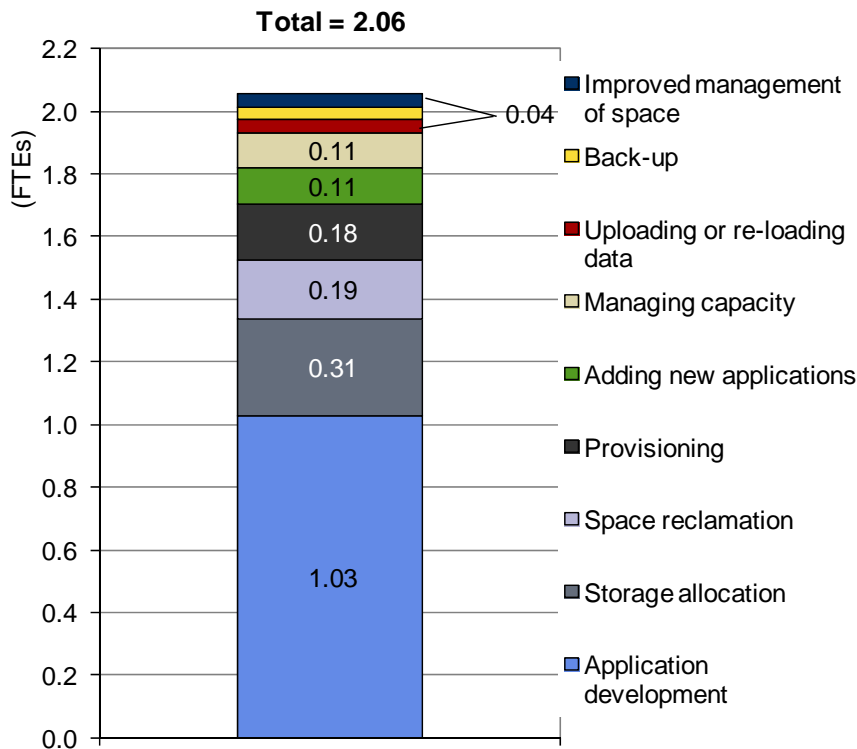
The organizations in our study have very fast growing storage environments (159% annually). They selected Dell storage solutions primarily because the solutions were highly cost efficient. What they found after the solutions had been in place for some time was that the automation, quality, modularity, and longevity optimized their IT staff resources so that despite growth, they were able to manage their storage operations without a corresponding growth in IT staff. As Figure 4 shows, the Dell storage solutions impacted every IT task associated with managing storage resources:

- ☒ **Storage provisioning and allocation.** Standardizing on a platform that allows you to provision and allocate storage based on preset criteria tailored to your organization's needs reduces the time normally spent responding to each instance. "Here's the problem: if I were still building servers the old way, I'd buy the storage five years in advance. So I'd build the server, and pay a lot of money to put the storage in the server. And it would just sit there. Now, I don't do that. I just use it as I need it. And it comes out of a pool, basically. When we bring in a new array, we just put it in. We don't manage it from a data migration perspective. But if we were using another vendor, I think we'd be spending time each time that happens... If I had to actually somehow migrate data."
- ☒ **Adding new applications.** Able to implement disk extensions quickly to support new applications.
- ☒ **Managing Capacity.** Scale-out architecture enables flexible capacity. Managed capacity enables an organization to meet changing demand without changing the overall footprint. "We let it self-migrate for a while and then put in 2 TB drives in the same footprint. We were just moving... shuffling data within the unit itself. All of it is self-managed on Compellent. There's more time savings there because when you're doing an upgrade on something that has an eight TB volume you don't have to go... and say, oh we're out of disk space, we have to go copy our data someplace else and move it and bring it in. There's a huge cost saving there."
- ☒ **Space Reclamation.** The data progression does that automatically, eliminating that requirement.
- ☒ **Improved Management of Space.** Dealing with downtime is significantly reduced due to fewer instances and quicker MTTR.
- ☒ Back-up and uploading or re-loading data operations is more automated and standardized, creating shorter windows and requiring less hands-on from the IT staff.

On an annual basis the companies saved \$4,687 per 100 users by increasing IT productivity.

FIGURE 4

IT Staff Productivity Benefits (FTEs)



Source: IDC, 2012

User Productivity

Businesses continue to automate their operations to reduce costs and increase agility. However, the IT environment is rapidly changing. Today, increased computing resources are more densely packed into fewer facilities, so storage failures due to capacity shortfalls, I/O issues, and extended backup operations are more frequently incurring disruptions which significantly impact operations. IT staff constantly seek to increase the reliability of their operations. The organizations in the study experienced high storage growth rates, which have resulted in increased complexity in their environments. Despite that increased complexity, they report that Dell storage has helped them to reduce the incidence of storage-related downtime. The organizations were effective at keeping the frequency of incidents down even prior to deployment of Dell storage solutions (less than one per month) but recovery time was slow at nearly eight hours. With Dell's Storage solutions they were able to reduce service failures by 59%. In fact, three of the organizations reported eliminating storage downtime entirely. More significantly, they were able to reduce recovery time to around 30 minutes.

On average, Dell Storage Solutions customers in the study were able to reduce their lost user productivity by 99%, restoring 37.9 hours of annual productivity to each end user.

TABLE 3

User Productivity Related Savings

	% improvement
Number of incidents per month	59%
Average downtime duration per incident (hours)	93%
Downtime hours annually (per user)	99%

Source: IDC, 2012

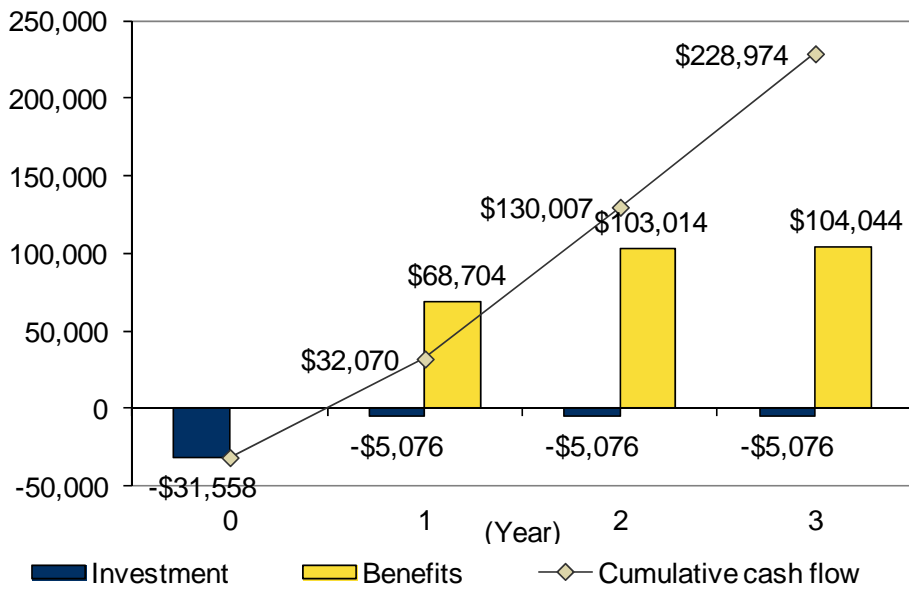
ROI Analysis

IDC looks at the cash flows of the financial benefits compared to the investment or total costs of the IT initiatives over a three-year period to assess return-on-investment (ROI). The initial investment included the average total costs to purchase and deploy the new systems, which includes hardware and software purchase; consulting and other third-party services required to architect and install the new systems; the costs and lost productivity associated with IT training; and the IT labor required for installation and migration of applications. Annual costs are for support and upgrades. Annual benefits include infrastructure savings, reduced IT labor support and increased end-user productivity.

Figure 5 shows the undiscounted cash flow analysis. Organizations in this study made an initial investment of \$31,558 per 100 users, which included the purchase and implementation costs to include consulting services and the IT labor required to deploy and train. Based on that investment, the organizations realized average annual benefits of \$100,005, per 100 users. Over a three-year period, each company saw cumulative net savings of over \$228,974 per 100 users.

FIGURE 5

Cash Flow Analysis (per 100 Users)



Source: IDC, 2012

Table 4 presents a three-year view of the financial impact of Dell storage solutions on a per-100 users basis. IDC uses a 12% cost of capital to discount cash flows.

The three-year ROI analysis shows that on average the organizations in this study spent \$43,471 (discounted) per 100 users on technology refresh and received \$217,521 (discounted) per 100 users in benefits for a net present value (NPV) of \$173,770. The companies saw a payback in six months (after deployment) and an ROI of 397%.

TABLE 4

Three-Year ROI Analysis (Per 100 Users)

Benefit (discounted)	\$217,521
Investment (discounted)	\$43,751
NPV	\$173,770
ROI	397%
Payback (months)	6.0
Discount rate	12%

Source: IDC, 2012

FUTURE OUTLOOK

Dell's recent expansion of its storage portfolio is notable, and not just for the energy and investment that the firm is putting into this part of its business. The company's focus on acquiring, developing, and integrating storage technologies, as well as launching services to respond to specific customer pain points, indicates a well-thought-out strategy and commitment to success.

An example of how Dell is integrating acquired technology is the Dell Fluid File System, based on technology picked up from Exanet. This Fall, Dell is completing the rollout of a complete line of NAS appliances that add CIFS and NFS file protocol services to the primary SAN storage product lines. Dell storage customers now have the ability to manage a single pool of shared storage with unified block and file capabilities.

The Fluid Data architecture, in which data is positioned automatically so as to be in the right place at the right time and at the right cost, is the foundation for the company's storage vision. Future enhancements will extend automated tiering to additional tiers beyond the conventional storage pool, such as storage-class memory (PCIe flash) in Dell servers, all the way through cloud storage. Data will be moved automatically through a spectrum of storage tiers that may cover a 1,000x range in price/performance. Integration of the RNA Networks acquisition will turn the memory in a Dell server or cluster into a tier of the managed storage pool. This will potentially provide dramatic increases in performance while maintaining high levels of data protection for a wide range of workloads. This is an example of how Dell's investment strategy in servers, storage, and networking is intended to bring benefits across the datacenter.

In order to mitigate the effects of data growth and drive higher levels of storage efficiency, Dell plans to integrate its Ocarina compression capability into both EqualLogic and Compellent platforms (Note: It has already been brought to market in the DR4000 purpose-built backup appliance, and the Dell DX Object storage product lines). Ocarina is context-sensitive in that the data type determines which compression algorithm is used. Pre-compressed video and imagery data is handled by a specialized process that delivers better results than a general-purpose algorithm could achieve. By embedding the compression capability in the EqualLogic and Compellent systems, the compressed data can be moved between tiers without the need for decompression, saving capacity, processing time, and network bandwidth.

CONCLUSION

In conducting this survey, it was notable that Dell storage users expressed particularly high levels of satisfaction. In many cases, users were impressed with the capabilities of Dell storage solutions compared to their experience with other vendors.

The interviews strongly validated the benefits that Dell promotes in its marketing campaigns. Automated tiered storage, simplified management, automatic load balancing, seamless upgrades, long life cycles and proactive support services were all seen to deliver significant customer value.

Despite its global IT presence, Dell could be considered a relative newcomer to the world of high-performance storage solutions. Through its vision of the Fluid Data architecture, it has a clear framework for the delivery of a broad and coherent set of storage solutions and services. The company is highly focused on integrating new

technology acquisitions into the portfolio and is spending heavily on research and development. In IDC's view, Dell is making strong progress in its evolution from a reseller of storage arrays to an end-to-end provider of innovative and commercially-sound storage solutions.

APPENDIX

What Does Data Actually Cost?

The challenge for the user is in quantifying the real financial benefits delivered by new storage technologies during the complete life cycle of the solution. Users know that it is increasingly untenable to evaluate storage infrastructure investments in terms of simple metrics like cost/TB, and they are looking to vendors to provide better financial tools that can deliver a clear assessment of the real return and improved return on assets (ROA) on their storage infrastructure investment.

Faced with these pressures, enterprise customers should not buy storage capacity "by the yard" based on a simple \$/TB comparison. Each additional TB will be subject to a broad range of operational costs, which can be summarized as follows:

- ☒ **Data protection** — The cost of the company's backup and business continuity infrastructure, which may include tape, replication, mirror sites, and all related planning and operational activity. This must be aligned with outage cost.
- ☒ **Maintenance** — The cost of hardware and software maintenance is linked to the capacity deployed, whether it is in use or not. Also it may rise as hardware warranties and bundled service deals expire.
- ☒ **Staff costs** — A significant portion is taken by the labor cost of storage administration and provisioning, particularly in complex heterogeneous environments that may have multiple management interfaces and distributed architectures.
- ☒ **Environment costs** — Power, cooling, and floor space costs are increasingly important as companies strive to meet efficiency targets that are often driven as much by a corporate and social responsibility agenda as the need to save money. A significant number of companies are reaching or have reached absolute limits on their datacenter growth and power consumption.
- ☒ **Outage cost** — Will vary widely depending on the company type, industry sector, and application concerned. A realistic estimate of outage costs is a key element in planning the company's business continuity arrangements.
- ☒ **Cost of growth** — This will depend on the tiering structure, since each tier is typically subject to different growth rates, capex costs, and drive price erosion. For example, lower tiers tend to grow more quickly than higher tiers and the price of SATA drives tends to fall faster than FC. There is also a cost impact in manually redistributing the data between the tiers.
- ☒ **Time-to-provision** — The ability to respond to new business requirements or changing workloads is becoming a key benchmark for IT. Storage is a crucial enabler that must become a frictionless component instead of a drag on time-to-market for strategic initiatives that increasingly depend on IT. Time is money.

- ☒ **Information governance** — An increasingly important element in the total cost of storage, with its obligations for companies to hold data for longer periods with a demonstrable search and recovery capability.
- ☒ **Migration** — Bringing new capacity online, taking old arrays out of service or moving applications between platforms can involve migration projects that may be time consuming and expensive, particularly in non-virtualized environments.
- ☒ **Performance** — Extra costs are incurred by the need to deploy storage systems of sufficient performance and scalability to meet the requirements of the SLAs agreed with the IT users. This may also mean that I/O performance upgrades are added at the same time as storage capacity upgrades.

When considering the total cost of storage ownership, the combined impact of this diverse and sometimes interrelated set of operational costs typically far outweighs the initial purchase price. In order to make a successful application for investment funding, an IT manager will increasingly be required to submit an analysis of the projected return on investment, taking into consideration both initial capital outlay and a comprehensive view of the life-cycle operational costs.

A broad measure of a company's ability to make profit from its invested capital is return on assets (ROA) — the ratio of net income to total assets. CxOs often regard IT storage as having a relatively poor ROA due to the low levels of capacity utilization that are typically seen, due to over-provisioning, data duplication, RAID overheads, and stranded capacity. Any measures that can help to drive up utilization levels will generally bring a welcome improvement in the ROA.

IDC ROI METHODOLOGY

IDC performs a three-step process to calculate the ROI and payback period:

1. Measure the benefits from reduced costs, increased availability, and improved IT productivity.
2. Ascertain the total investment in the solution (hardware, software, FTE requirements for deployment and annual maintenance, customization, training, and consulting).
3. Project the investment and benefit over three years and calculate the ROI and payback period for the solution.

To account for the time value of money, IDC bases the ROI and payback period calculations on a 12% discounted cash flow.

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