A Forrester Total Economic Impact™ Study Prepared For HP

The Total Economic Impact Of HP 3PAR Storage

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FORRESTER®

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Executive Summary

In March 2012, HP Storage commissioned Forrester Consulting to examine the total economic impact and potential return on investment (ROI) enterprises may realize by deploying HP 3PAR Storage. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of HP 3PAR Storage solutions on their organizations.

HP 3PAR Storage Allows Organizations To Avoid Capital Expenses

Our interviews with four existing customer and subsequent financial analysis found that, with respect to their investments in HP 3PAR Storage, a composite organization based on these companies experienced the risk-adjusted ROI, costs, and benefits shown in Table 1. (See Appendix A for a description of the composite organization.)

Table 1

Composite Organization: Three-Year Risk-Adjusted ROI[1]

ROI	Payback period	Total benefits (PV)	Total costs (PV)	Net present value (NPV)
55%	10.4 months	$734,484	($474,649)	$259,835

Source: Forrester Research, Inc.

- **Benefits.** The composite organization experienced the following benefits that represent those experienced by the interviewed companies:
  - **Capital expense avoided of $324,154.** This is driven primarily by HP 3PAR Thin Provisioning, which increases storage capacity utilization in HP 3PAR Storage systems and results in lower capital expenditure for storage capacity.
  - **Maintenance expense avoided of $235,008.** This number represents maintenance fees paid to vendors, as well as the difference between the maintenance expense that would have been incurred in order to maintain existing legacy storage systems compared with the cost of maintaining the HP 3PAR Storage systems that replaced them. This savings is driven primarily by the fact that HP 3PAR Thin Provisioning allows less capacity to be purchased.
  - **Labor productivity improvement of $175,323.** This is driven by increased efficiency in performing a variety of storage management tasks with HP 3PAR Storage, including provisioning arrays, configuring and presenting storage to hosts, snapshot creation, and overall greater ease of use.
- **Costs.** The composite organization experienced the following costs consistent with those experienced by the interviewed organizations:

- **Storage acquisition costs of $394,812.** This is the cost of the HP 3PAR V400 Storage array configured with 192 TB of raw storage and all associated software.
- **Maintenance fees of $30,942.** This is the total three-year maintenance contract for the array.
- **Professional services expense of $24,350.** While optional, professional services may be used for initial deployment, configurations, and training.
- **Data migration expense of $24,545.** This is the internal labor cost to migrate data from legacy storage to HP 3PAR Storage.

Factors Affecting Benefits And Costs

Table 1 illustrates the risk-adjusted financial results that were achieved by the composite organization. The risk-adjusted values take into account any potential uncertainty or variance that exists in estimating the costs and benefits, which produces more conservative estimates.

The following factors may affect the financial results that an organization may experience:

- The capital expense avoided and equipment acquisition costs will vary with the model and capacity of the proposed HP 3PAR Storage system.
- Savings on annual maintenance expense will depend on the actual maintenance expense paid for legacy equipment and for the proposed HP 3PAR Storage solution.
- Labor productivity improvements will vary with the frequency and type of data storage administration tasks that each user organization experiences.

Disclosures

The reader should be aware of the following:

- The study is commissioned by HP Storage and delivered by the Forrester Consulting group.
- Forrester makes no assumptions as to the potential ROI that other organizations will receive. Forrester strongly advises that readers should use their own estimates within the framework provided in the report to determine the appropriateness of an investment in HP 3PAR Storage.
- HP reviewed and provided feedback to Forrester, but Forrester maintains editorial control over the study and its findings and does not accept changes to the study that contradict Forrester's findings or obscure the meaning of the study.
- The customer names for the interviews were provided by HP.

TEI Framework And Methodology

Introduction

From the information provided in the interviews, Forrester has constructed a Total Economic Impact™ framework for those organizations considering implementing HP 3PAR Storage. The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision.

Approach And Methodology

Forrester took a multistep approach to evaluate the impact that HP 3PAR Storage can have on an organization (see Figure 1). Specifically, we:

- Interviewed HP marketing/sales/consultants personnel and Forrester analysts to gather data relative to HP 3PAR Storage and the marketplace for enterprise data storage solutions.
- Interviewed four organizations currently using HP 3PAR Storage to obtain data with respect to costs, benefits, and risks.
- Designed a composite organization based on characteristics of the interviewed organizations (see Appendix A).
- Constructed a financial model representative of the interviews using the TEI methodology. The financial model is populated with the cost and benefit data obtained from the interviews as applied to the composite organization.

Figure 1
TEI Approach

Source: Forrester Research, Inc.

Forrester employed four fundamental elements of TEI in modeling HP 3PAR Storage solutions:

1. Costs.
2. Benefits to the entire organization.
3. Flexibility.
4. Risk.

Given the increasing sophistication that enterprises have regarding ROI analyses related to IT investments, Forrester's TEI methodology serves the purpose of providing a complete picture of the total economic impact of purchasing decisions. Please see Appendix B for additional information on the TEI methodology.

Analysis

Interview Highlights

Interviewed Customers

A total of four interviews were conducted for this study, involving representatives from the following HP 3PAR Storage customers:

1. **A global network services provider.** This company owns 4 PB of storage, of which 25% is HP 3PAR Storage. The company has been using HP 3PAR Storage in a full production environment for 12 months.
2. **A home furnishings retailer with more than 1,000 stores across North America.** All of the company's 400 TB of storage are hosted on HP 3PAR Storage equipment. The company has been using HP 3PAR Storage in a production environment for two years.
3. **An international financial services firm.** This organization manages 24 PB of storage, of which 4 PB is hosted on HP 3PAR Storage. This firm has used HP 3PAR Storage in a production environment for six years, and is now the global strategic standard for tier 2 storage.
4. **A global software-as-a-service provider.** This company has 1.5 PB of data hosted on HP 3PAR Storage, which is used exclusively in the company's R&D environment.

Reasons For Adopting HP 3PAR Storage

The four companies we interviewed had widely varying storage needs and data center environments. Despite this, their reasons for adopting HP 3PAR Storage centered around three common themes:

- **Reducing storage management labor effort.** The interviewed companies found that, in aggregate, too much time was needed to perform essential management tasks like provisioning, presenting storage to hosts, creating snapshots, and capacity planning. The organizations wished to assign their storage personnel to higher productivity tasks and ensure that they could meet internal service-level agreements.
- **Minimizing upfront capital expense.** The interviewed companies described themselves as "cost conscious" and wished to minimize their initial capital expense when making their next round of storage upgrades. The companies used sophisticated analyses to compare the value of competing storage solutions and looked at measures such as $/IOPS, $/usable GB, and $/expansion GB in addition to long-term operations costs.
- **Minimizing data center footprint.** Lack of floor space for equipment expansion drove the need to find high density storage solutions. In this case, "density" translated to "spindles/square foot of floor tile."

Qualitative Findings

Collectively, the interviewed companies experienced a broad range of qualitative benefits as a result of deploying HP 3PAR Storage. Note that the each interviewed company experienced some but not all of these benefits.

These benefits included:

- **Increased capacity utilization by 16% to 40%.** HP 3PAR Thin Provisioning coupled with improved visibility into storage consumption were the major contributors to this benefit. Increased efficiency in storage utilization resulted in reduced storage allocations (usually caused by poorly scoped out requests from the application teams), which in turn allowed the companies to reduce or delay capital expenses.

- **Simplified storage management.** At the most basic level, the companies found that they could manage all their HP 3PAR Storage capacity as a single pool, as opposed to multiple islands of storage. This allowed for greater flexibility in assigning and managing storage resources, and reduced effort for performing storage management tasks.

- **Increased storage densities.** Those companies that had space constraints in their data centers reported that HP 3PAR Storage allowed them to consolidate their storage infrastructure into fewer shelves and racks. When coupled with the flexibility in where they could locate the arrays, the companies were able to maximize the use of the available data center floor space and didn't need to expand the data center. There was an additional benefit of reduced power and cooling expense.

- **Increased number of virtual machines per LUN.** According to one interviewee, "VMware on top of 3PAR was a match made in heaven" because the customer could very effectively use Thin Provisioning to reduce storage allocations. In this customer's experience, a user would ask for 70 TB but actually use only 20 TB. This generated "a thin LUN win of 50 TB." Overall, this resulted in capital expenditure (capex) avoided of $500,000 to $800,000 in one environment.

- **Reduced dependency on third-party management and reporting tools.** The companies interviewed found that the management utilities available for hosts served by HP 3PAR Storage were highly effective and allowed them to avoid purchasing additional tools as they had to with their prior storage platforms. Similarly, they found the cost of HP 3PAR System Reporter software to be lower than that of reporting tools used with their legacy storage environment.

- **Minimal installation and training effort.** The companies reported that they found it easy to install and learn how to use HP 3PAR Storage, which in some cases allowed them to avoid the cost of additional professional services.

Composite Organization

Based on the interviews with the four existing customers provided by HP, Forrester constructed a TEI framework, a composite company, and an associated ROI analysis that illustrates the areas financially affected by the investment in HP 3PAR Storage. The composite organization that Forrester synthesized from these results represents a $1B company.

Prior to deploying HP 3PAR Storage, the composite organization had 600 TB total storage, split between RAID 1 and RAID 5 (3+1) configurations. Approximately 30% or 124 TB of the total usable storage was being utilized. The composite organization proposed to migrate its storage to HP 3PAR V400 Storage configured with 192 TB of raw storage capacity. This would accommodate RAID 1 and RAID 5 configurations with approximately 17% additional capacity for growth. See Appendix A for a complete description of the composite organization.

Proposed HP 3PAR Storage Solution

For this analysis, the proposed HP 3PAR Storage solution consisted of:

- HP 3PAR V400 Storage with 192 TB of raw storage capacity.
- HP 3PAR Thin Suite, Virtual Copy, and System Reporter software.
- Basic "Support Plus 24" support.
- Professional services for planning and deployment.

Framework Assumptions

Table 2 provides the model assumptions that Forrester used in this analysis.

Table 2
Model Assumptions

Ref.	Metric	Calculation	Value
A1	Storage administrator annual salary		$100,000
A2	Salary overhead multiplier		1.25

Source: Forrester Research, Inc.

The discount rate used in the PV and NPV calculations is 10% and time horizon used for the financial modeling is three years. Organizations typically use discount rates between 8% and 16% based on their current environment. Readers are urged to consult with their respective company's finance departments to determine the most appropriate discount rate to use within their own organizations.

Costs

From the interviews, we learned of a wide range of expenses associated with deploying and operating HP 3PAR Storage. We included the following in this economic analysis:

- Storage equipment acquisition costs.
- Annual maintenance fees paid to HP.
- Professional services used for the initial deployment.
- Data migration labor expense.

We excluded the following expenses from the economic analysis:

- Deployment expense, which was usually low and variable. Deployment expenses were usually included in the professional services fees, required minimal labor from the storage management team, or included other miscellaneous expenses like data center wiring.
- Storage administrative expense, because the overall labor costs associated with storage management were unchanged after deploying HP 3PAR Storage (i.e., headcount remained unchanged), and the administrative expense would have been incurred regardless of which solution was ultimately deployed. We note that HP 3PAR Storage generated a net labor productivity improvement, which is treated as a benefit.

Storage Equipment Acquisition Costs

The proposed HP solution consists of HP 3PAR V400 Storage with 192 TB capacity. It also has the HP 3PAR Thin Suite, Virtual Copy, and System Reporter software. The total expense of the hardware and software is $394,812 (see Table 3). All pricing was supplied to Forrester by HP and reflects pricing as of Q1 2012.

Table 3

HP 3PAR Storage Equipment Acquisition Costs

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
B1	HP 3PAR V400 Storage costs		$394,812				
B2	Number of units		1				
Bt	Storage equipment acquisition costs	B1*B2	$394,812	$0	$0	$0	
	Spread		100%	0%	0%	0%	
Bto	Total (original)		($394,812)	$0	$0	$0	($394,812)

Source: Forrester Research, Inc.

Annual Maintenance Fees

Maintenance fees are paid annually and were quoted by HP at $12,442 per annum. This yields three-year total maintenance fees of $37,326 (see Table 4).

Table 4
Annual Maintenance Fees

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
C1	Annual hardware and software maintenance expense			$12,442			
Ct	Annual maintenance fees	C1	$0	$12,442	$12,442	$12,442	
	Spread		0%	100%	100%	100%	
Cto	Total (Original)		$0	($12,442)	($12,442)	($12,442)	($37,326)

Source: Forrester Research, Inc.

Professional Services Fees

Included in the HP 3PAR Storage solution are professional services fees to assist customers with initial deployment and configuration. We learned that not all the companies we interviewed incurred professional services fees, as some were able to undertake the configuration tasks unaided. The organizations interviewed noted that they experienced high levels of customer support despite not having professional services agreements in place.

For this analysis, the quoted professional services fees total $24,350 (see Table 5).

Table 5
Professional Services Fees

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
D1	Professional services fees		$24,350				
Dt	Professional services fees	D1	$24,350	$0	$0	$0	
	Spread		100%	0%	0%	0%	
Dto	Total (original)		($24,350)	$0	$0	$0	($24,350)

Source: Forrester Research, Inc.

Data Migration Expense

The interviewed companies that replaced legacy storage equipment with HP 3PAR Storage needed to migrate their data from the legacy equipment to the new solution. The interviewed customers adopted varying approaches to data

migration, which they found to be a relatively straightforward task. We recognize that organizations may use professional services to perform data migration, which may result in substantially higher costs compared with using internal resources.

For this analysis, we assumed that the data migration task is spread over a six-month period. We also assume that the required labor effort consists of 20% of two storage administrators spread over the six-month period. This yields a total data migration cost of $25,000 (see Table 6).

Table 6
Data Migration Expense

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
E1	Number of people			2			
E2	Number of months needed for the migration			6			
E3	Percentage time spent on migration work			20%			
E4	Storage administrator fully loaded salary	A1*A2		$125,000			
Et	Data migration expense	E1*E2/12*E3*E4	$0	$25,000			
	Spread		0%	100%	0%	0%	
Eto	Total (original)		$0	($25,000)	$0	$0	($25,000)

Source: Forrester Research, Inc.

Total Costs

For the composite organization, the total cost to acquire, deploy, and administer HP 3PAR Storage over a three-year time frame was $481,488 (see Table 7).

Table 7
Total Costs

Ref.	Cost category	Initial	Year 1	Year 2	Year 3	Total
Bto	Storage equipment acquisition costs	($394,812)	$0	$0	$0	($394,812)
Cto	Annual maintenance fees	$0	($12,442)	($12,442)	($12,442)	($37,326)
Dto	Professional services fees	($24,350)	$0	$0	$0	($24,350)
Eto	Data migration expense	$0	($25,000)	$0	$0	($25,000)
	Total costs (original)	($419,162)	($37,442)	($12,442)	($12,442)	($481,488)

Source: Forrester Research, Inc.

Benefits

We learned that the interviewed companies experienced the following financially quantifiable benefits as a result of migrating to HP 3PAR Storage:

- Capital expense avoided due to the lower acquisition costs of HP 3PAR Storage relative to upgrading legacy equipment with similar capabilities.
- Maintenance expense avoided after replacing legacy storage equipment with HP 3PAR Storage.
- Labor productivity improvements associated with the simplicity of managing HP 3PAR Storage in comparison with legacy solutions.

In one instance, an interviewed company enjoyed the benefit of avoiding acquisition costs for additional reporting software that was incurred with their legacy equipment. Since this benefit was not common to all the interviewed companies, it is not included in the financial analysis.

Capital Expense Avoided For Storage Equipment

The interviewed companies reported lower acquisition costs of HP 3PAR Storage relative to the other solutions considered. The savings ranged from 33% to 49%, with the variance driven by how much legacy storage was replaced, as well as the make/model of legacy equipment.

The primary factor that contributed to these savings was the use of HP 3PAR Thin Provisioning software to reduce the amount of storage allocated to applications and increasing the utilization of available storage capacity. This meant that less storage was needed overall, thereby lowering storage acquisition costs. One interviewee cited higher "density of spindles per floor tile," which allowed them to purchase fewer arrays relative to their legacy solutions.

For the composite organization, we assumed a capital expense savings of 46%. Using the cost of HP 3PAR Storage as a basis for calculating the value of the savings, the composite organization avoided a capital expense of $379,329 (see Table 8).

Table 8
Capital Expense Avoided

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
F1	Cost of HP 3PAR Storage			$394,812			
F2	Percentage saved over alternate vendor solution			49%			
Ft	Capital expense avoided for storage arrays	F1/(1-F2)-F1		$379,329			
	Spread			100%			
Fto	Total (original)			$379,329	$0	$0	$379,329

Source: Forrester Research, Inc.

Maintenance Expense Avoided

The interviewed companies found that the maintenance fees paid to their storage vendors was lower for HP 3PAR Storage when compared with their legacy solutions. The savings ranged from 30% to 87% depending on the make, model, and amount of legacy equipment that was replaced, as was well as the model of HP 3PAR Storage system purchased.

For the composite organization, we assumed that the maintenance expense of the legacy equipment is $150,000/year, and maintenance expense of the proposed HP 3PAR Storage system is 70% lower. This generates annual savings of $105,000 and total savings of $315,000 (see Table 9).

Table 9
Maintenance Expense Avoided

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
G1	Average annual maintenance cost of retired storage gear			$150,000			
G2	Average percentage annual maintenance savings of HP 3PAR Storage replacement gear			70%			
G3	Percentage captured			100%			
Gt	Maintenance expense avoided	G1*G2*G3		$105,000	$105,000	$105,000	
	Spread			100%	100%	100%	
Gto	Total (original)			$105,000	$105,000	$105,000	$315,000

Source: Forrester Research, Inc.

Improved Labor Productivity

The interviewed companies reported that a wide range of day-to-day management tasks could be performed more easily and efficiently on HP 3PAR Storage compared with their legacy storage solutions. The storage administrators found the management interface easy to learn, requiring little or no training. The ease of performing day-to-day storage management tasks contributed greatly to the interviewed companies' overall satisfaction with their HP 3PAR Storage solutions.

The labor productivity savings associated with specific management tasks included:

- Configuring and presenting storage to hosts: reduced from 2 to 3 hours to less than 5 minutes.
- Provisioning an array: reduced from 1 to 5 days to less than 1 day.
- Generating a snapshot: reduced from 8 hours to less than 10 minutes.
- Tracking and management of storage utilization: elimination of spreadsheets to manage multiple systems. Overall task time reduced from hours to less than 20 minutes due to the ability to manage all HP 3PAR Storage capacity as a single pool.

For the composite organization, we assumed that overall labor productivity improvement associated with day-to-day storage management tasks to be equivalent to 50% of one full-time employee (FTE). This generates an annual labor savings of $75,000 annually (see Table 10).

Table 10
Labor Productivity Improvement

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
H1	Number of FTEs needed to manage legacy storage gear			4			
H2	Percentage of labor dedicated to managing legacy storage replaced with HP 3PAR Storage			30%			
H3	Percentage labor savings in HP 3PAR Storage environment			50%			
H4	Storage manager fully loaded salary			$125,000			
Ht	Labor productivity improvement	H1*H2*H3*H4		$75,000	$75,000	$75,000	
	Spread			100%	100%	100%	
Hto	Total (original)			$75,000	$75,000	$75,000	$225,000

Source: Forrester Research, Inc.

Total Benefits

The total benefits experienced by the composite organization are $919,329 (see Table 11).

Table 11
Total Benefits

Ref.	Benefit category	Initial	Year 1	Year 2	Year 3	Total
Fto	Capital expense avoided for storage arrays		$379,329	$0	$0	$379,329
Gto	Maintenance expense avoided		$105,000	$105,000	$105,000	$315,000
Hto	Labor productivity improvement		$75,000	$75,000	$75,000	$225,000
	Total benefits (original)		$559,329	$180,000	$180,000	$919,329

Source: Forrester Research, Inc.

Flexibility

Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could be turned into business benefit for some future additional investment. This provides an organization with the "right" or the ability to engage in future initiatives but not the obligation to do so. There are multiple scenarios in which a customer might choose to implement HP 3PAR Storage and later realize additional uses and business opportunities. Flexibility would also be quantified when evaluated as part of a specific project (described in more detail in Appendix B.)

No flexibility benefits associated with HP 3PAR Storage were described by the interviewed organizations.

Risk

Forrester defines two types of risk associated with this analysis: implementation risk and impact risk. "Implementation risk" is the risk that a proposed investment in HP 3PAR Storage may deviate from the original or expected requirements, resulting in higher costs than anticipated. "Impact risk" refers to the risk that the business or technology needs of the organization may not be met by the investment in HP 3PAR Storage resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for cost and benefit estimates.

Quantitatively capturing investment and impact risk by directly adjusting the financial estimates results in more meaningful and accurate estimates and a more accurate projection of the ROI. In general, risks affect costs by raising the original estimates, and they affect benefits by reducing the original estimates. The risk-adjusted numbers should be taken as "realistic" expectations since they represent the expected values considering risk.

We learned from the interviewed companies that the overall implementation risks associated with HP 3PAR Storage are relatively low. The following implementation risk that affects costs is identified as part of this analysis:

- The effort needed to migrate data from legacy systems to HP 3PAR Storage will vary with the number of legacy systems, the amount of data that is migrated, and the amount of data cleaning that is done during the migration.

The following impact risks affecting benefits are identified as part of the analysis:

- The capital costs avoided will vary with the proposed cost of the HP 3PAR Storage solution in comparison with other proposed solutions.
- The maintenance expense avoided will vary according to the configuration of the legacy solution that is being replaced.
- Labor productivity improvements will vary according to the labor effort needed to maintain the legacy solution in comparison to the labor effort needed to maintain HP 3PAR Storage.

Table 12 shows the values used to adjust for risk and uncertainty in the cost and benefit estimates. The TEI model uses a triangular distribution method to calculate risk-adjusted values. To construct the distribution, it is necessary to first estimate the low, most likely, and high values that could occur within the current environment. The risk-adjusted value is the mean of the distribution of those points. Readers are urged to apply their own risk ranges based on their own degree of confidence in the cost and benefit estimates.

Table 12
Cost And Benefit Risk Adjustments

Costs	Low	Most likely	High	Mean
Data migration expense	98%	100%	105%	101%
Benefits	**Low**	**Most likely**	**High**	**Mean**
Capital expense avoided for storage arrays	80%	100%	103%	94%
Maintenance expense avoided	50%	100%	120%	90%
Labor productivity improvement	80%	100%	103%	94%

Source: Forrester Research, Inc.

Financial Summary

The financial results calculated in the Costs and Benefits sections can be used to determine the ROI, NPV, and payback period for the composite organization's investment in HP 3PAR Storage. These are shown in Table 13 below.

Table 13
Cash Flow — Non-Risk-Adjusted

Cash flow — original estimates						
	Initial	Year 1	Year 2	Year 3	Total	Present value
Costs	($419,162)	($37,442)	($12,442)	($12,442)	($481,488)	($472,831)
Benefits		$559,329	$180,000	$180,000	$919,329	$792,478
Net benefits	($419,162)	$521,887	$167,558	$167,558	$437,841	$319,647
ROI	68%					
Payback period	9.6 months					

Source: Forrester Research, Inc.

Table 14 below shows the risk-adjusted ROI, NPV, and payback period values. These values are determined by applying the risk-adjustment values from Table 12 in the Risk section to the cost and benefits numbers in Tables 7 and 11.

Table 14
Cash Flow — Risk-Adjusted

Cash flow — risk-adjusted estimates						
	Initial	Year 1	Year 2	Year 3	Total	Present value
Costs	($419,162)	($39,442)	($12,442)	($12,442)	($483,488)	($474,649)
Benefits		$521,569	$165,000	$165,000	$851,569	$734,484
Net benefits	($419,162)	$482,127	$152,558	$152,558	$368,081	$259,835
ROI	55%					
Payback period	10.4 months					

Source: Forrester Research, Inc.

HP 3PAR Storage Overview

According to HP, HP 3PAR Storage provides utility storage solutions built for the delivery of IT-as-a-service, and are ideal for virtualization and the cloud.

With HP 3PAR Storage, users can:

- Support multitenant mixed workloads with high performance and scalability via its mesh-active architectural design.
- Use HP 3PAR Thin Provisioning software and other thin technologies to reduce capacity requirements and reclaim allocated but unused capacity.
- Move data and workloads between storage systems with minimal application interruption or additional management layers or appliances.
- Autonomically manage HP 3PAR Storage with fast provisioning, increasing storage management efficiencies and service levels.

Appendix A: Composite Organization Description

In this TEI study, Forrester has created a composite or reference organization to illustrate the quantifiable costs and benefits, risk, and flexibility of deploying HP 3PAR Storage. The composite organization was derived from the four user interviews conducted for this study.

The composite organization is a $1 billion company. The organization has 600 TB total raw storage, located in a single data center. Twenty five percent (or 150 TB) is configured as RAID 1 or "mirrored" with 100% redundancy overhead. Of the 75 TB usable capacity that this yields, data utilization or actual data written is 30%, which is typical in the industry, which amounts to 22.5 TB of data. The remaining 450 TB is configured as RAID 5 (3+1), yielding 337.5 TB of usable storage. Of the usable RAID 5 storage, 30% or 101.25 TB is written.

The storage is used for production, disaster recovery, and testing purposes. Approximately 200 physical hosts (servers) and 1,500 virtual hosts (virtual machines) access the storage. The organization sources its storage from two different vendors and, over the years, has accumulated a wide selection of storage array models.

The organization's historical storage growth rate is 10% to 15% annually. The storage management team consists of a team leader, two FTEs for primary storage operations, and two FTEs for managing backup and disaster recovery. The storage management team typically over-provisioned storage when fulfilling storage requests from the application team in order to avoid storage management headaches down the road. This practice resulted in an inefficient use of storage capacity reflected in the 30% utilization rate. The organization's storage management tools did not allow them to get a clear understanding of the actual amount of storage that was used (i.e., actual data being written), which therefore would require a file system audit to obtain.

Prior to deploying HP 3PAR Storage, the organization planned to replace all of its 600 TB of storage, which was hosted on four arrays that were reaching end of life. Because there was no additional floor space in the data center for expansion purposes, the storage management team wanted a solution with maximum storage density. They also wanted a solution that would reduce the need for over-provisioning, thus increasing the storage capacity utilization and overall storage efficiency.

The organization conducted a deep analysis of available storage solutions, using various benchmarks like $/IOPS, $/gigabyte for acquisition, $/usable gigabyte, and long-term maintenance costs. The organization chose HP 3PAR Storage because of its acquisition cost and Thin Provisioning technology, which it believed would help optimize storage capacity utilization and reduce storage management overhead. The proposed HP 3PAR Storage system consisted of a V400 storage array with 192 TB of raw storage configured as RAID 5 (3+1). This would accommodate the 124 TB of the composite organization's written data with a 21% buffer for data growth.

Appendix B: Total Economic Impact™ Overview

Total Economic Impact is a methodology developed by Forrester Research that enhances a company's technology decision-making processes and assists vendors in communicating the value proposition of their products and services to clients. The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

The TEI methodology consists of four components to evaluate investment value: benefits, costs, risks, and flexibility.

Benefits

Benefits represent the value delivered to the user organization — IT and/or business units — by the proposed product or project. Often product or project justification exercises focus just on IT cost and cost reduction, leaving little room to analyze the effect of the technology on the entire organization. The TEI methodology and the resulting financial model place equal weight on the measure of benefits and the measure of costs, allowing for a full examination of the effect of the technology on the entire organization. Calculation of benefit estimates involves a clear dialogue with the user organization to understand the specific value that is created. In addition, Forrester also requires that there be a clear line of accountability established between the measurement and justification of benefit estimates after the project has been completed. This ensures that benefit estimates tie back directly to the bottom line.

Costs

Costs represent the investment necessary to capture the value, or benefits, of the proposed project. IT or the business units may incur costs in the form of fully burdened labor, subcontractors, or materials. Costs consider all the investments and expenses necessary to deliver the proposed value. In addition, the cost category within TEI captures any incremental costs over the existing environment for ongoing costs associated with the solution. All costs must be tied to the benefits that are created.

Risk

Risk measures the uncertainty of benefit and cost estimates contained within the investment. Uncertainty is measured in two ways: 1) the likelihood that the cost and benefit estimates will meet the original projections, and 2) the likelihood that the estimates will be measured and tracked over time. TEI applies a probability density function known as "triangular distribution" to the values entered. At minimum, three values are calculated to estimate the underlying range around each cost and benefit.

Flexibility

Within the TEI methodology, direct benefits represent one part of the investment value. While direct benefits can typically be the primary way to justify a project, Forrester believes that organizations should be able to measure the strategic value of an investment. Flexibility represents the value that can be obtained for some future additional investment building on top of the initial investment already made. For instance, an investment in an enterprisewide upgrade of an office productivity suite can potentially increase standardization (to increase efficiency) and reduce licensing costs. However, an embedded collaboration feature may translate to greater worker productivity if activated. The collaboration can only be used with additional investment in training at some future point in time. However, having the ability to capture that benefit has a present value that can be estimated. The flexibility component of TEI captures that value.

Appendix C: Glossary

Discount rate: The interest rate used in cash flow analysis to take into account the time value of money. Although the Federal Reserve Bank sets a discount rate, companies often set a discount rate based on their business and investment environment. Forrester assumes a yearly discount rate of 10% for this analysis. Organizations typically use discount rates between 8% and 16% based on their current environment. Readers are urged to consult their respective organization to determine the most appropriate discount rate to use in their own environment.

Net present value (NPV): The present or current value of (discounted) future net cash flows given an interest rate (the discount rate). A positive project NPV normally indicates that the investment should be made, unless other projects have higher NPVs.

Present value (PV): The present or current value of (discounted) cost and benefit estimates given at an interest rate (the discount rate). The PV of costs and benefits feed into the total net present value of cash flows.

Payback period: The breakeven point for an investment. The point in time at which net benefits (benefits minus costs) equal initial investment or cost.

Return on investment (ROI): A measure of a project's expected return in percentage terms. ROI is calculated by dividing net benefits (benefits minus costs) by costs.

A Note On Cash Flow Tables

The following is a note on the cash flow tables used in this study (see the example table below). The initial investment column contains costs incurred at "time 0" or at the beginning of Year 1. Those costs are not discounted. All other cash flows in Years 1 through 3 are discounted using the discount rate (shown in the Framework Assumptions section) at the end of the year. Present value (PV) calculations are calculated for each total cost and benefit estimate. Net present value (NPV) calculations are not calculated until the summary tables and are the sum of the initial investment and the discounted cash flows in each year.

Table [Example]
Example Table

Ref.	Category	Calculation	Initial cost	Year 1	Year 2	Year 3	Total

Source: Forrester Research, Inc.

Appendix D: Endnotes

[1] Forrester risk-adjusts the summary financial metrics to take into account the potential uncertainty of the cost and benefit estimates. For more information on Risk, please see page 16.