The Total Economic Impact™ Of Pure Storage FlashArray Storage Solutions

Cost Savings And Business Benefits Enabled By FlashArray Storage Solutions

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ABOUT FORRESTER CONSULTING

Forrester Consulting provides independent and objective research-based consulting to help leaders succeed in their organizations. Ranging in scope from a short strategy session to custom projects, Forrester's Consulting services connect you directly with research analysts who apply expert insight to your specific business challenges. For more information, visit forrester.com/consulting.

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Highlights From This Customer-Focused Case Study

Simple Configuration
Customers said it was quick and easy to deploy their FlashArray storage solutions.

No Downtime
Customers avoid both planned and unplanned downtime with FlashArray storage solutions.

Easy To Manage
Customers reported significant time savings, owing to the ease with which they can manage their FlashArray storage solutions.

Executive Summary

Pure Storage commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential ROI enterprises may realize by adopting a Pure Storage FlashArray storage solution. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact for their organizations of an investment in a Pure Storage FlashArray storage solution.

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed four customers with several years of experience using Pure Storage FlashArray storage solutions. In addition, to further assess the business value of Pure Storage FlashArray storage solutions, Forrester conducted a global survey of 36 Pure Storage customers.

Prior to upgrading to a Pure Storage FlashArray storage solution, the interviewed customers relied on spinning disk storage solutions from competing vendors. These solutions performed poorly and required extensive maintenance and upkeep, putting a strain on infrastructure and IT teams:

› Storage refreshes and adding capacity to existing arrays required a significant commitment from permanent staff and oftentimes the support of an outside systems integrator.

› Customers reported frequent downtime, both planned and unplanned. In the case of the former, systems engineers scheduled upgrades and patches on nights and weekends to avoid disruption to the business. In the case of the latter, they frequently worked unanticipated overtime to get storage back online and performant.

› Performance issues slowed down even routine workflows, including server migrations and the execution of disaster recovery routines.

With the investment in Pure Storage, customers reclaimed time and resources previously dedicated to managing their storage infrastructure:

› Customers described setup and configuration as quick and easy. None of the interviewed customers relied on third-party contractors during the setup process, despite having done so during their prior storage refresh.

› Multiple customers reported that unplanned downtime went to zero — despite previously reaching upwards of 68 hours at one organization — after the upgrade to a FlashArray storage solution. They also indicated that planned downtime is almost nonexistent, owing to seamless updates, which are managed in large part by Pure Storage.

› Customers reported that performance improvements enabled them to execute routine workflows quickly, and that the increased speed and performance of the storage solution enhanced their ability to deliver services to their organizations.

Based on the customer interviews, as well as responses to the survey, Forrester created a composite organization to illustrate the benefits and costs associated with an investment in a Pure Storage FlashArray storage solution. The analysis revealed that an investment in a Pure Storage FlashArray storage solution had the following impact over a six-year period: $1,113,986 in benefits versus costs of $528,615, resulting in a net present value (NPV) of $585,371 and an ROI of 111%.

ROI
111%

Benefits PV
$1.1 million

NPV
$585K

Payback
<6 months

Key Findings

Quantified benefits. The following risk-adjusted, present value (PV) benefits are representative of those experienced by interviewees and survey respondents over a six-year period of analysis:

› **Reduced effort to manage and maintain the storage environment, totaling $490,380.** Customers told Forrester that their Pure Storage FlashArray storage solutions require significantly less time to manage than preexisting storage solutions, allowing them to dedicate full-time resources to other activities. In particular, customers reported time savings for the following activities: 1) patching and upgrades; 2) testing disaster recovery routines; 3) data backup and recovery; 4) scheduling and coordinating downtime; and 5) provisioning storage for developers.

› **Reduced effort in storage deployment workflows, totaling $77,705.** Customers reported being able to deploy their FlashArray storage solutions quickly and without professional services. Moving forward, they will also avoid time-consuming data migrations, since FlashArray storage solutions can be upgraded in a nondisruptive manner.

› **Avoided training costs for new systems engineers, totaling $13,036.** Customers reported being able to train new hires more quickly on FlashArray storage solutions than preexisting storage solutions. This not only makes it easier to find new employees, but it also makes it less costly to train them.

› **Reduction in colocation facility rack space costs, totaling $142,273.** By switching to a Pure Storage FlashArray storage solution, customers were able to fit more storage into smaller physical spaces. For those that utilized colocation facilities, this translated into a reduction in operational costs.

› **Avoided capital expenses and maintenance costs for alternative storage solutions, totaling $390,592.** By selecting a Pure Storage FlashArray storage solution, customers avoided upfront and ongoing costs associated with alternative storage solutions. (Costs for the Pure Storage FlashArray solution are reflected in the section titled Analysis Of Costs.)

Unquantified benefits. The interviewed organizations experienced the following benefits, which are not quantified for this study:

› **Improved service delivery.** Several customers told Forrester that their investment in a FlashArray storage solution enabled them to deliver higher quality services to their organizations. For example, the assistant director of infrastructure at the university reported a notable improvement in performance of student and faculty applications, owing to simultaneous upgrades to the organization's storage environment and networking infrastructure.

› **Improved employee experience.** Prior to upgrading to a FlashArray storage solution, hardware issues were common, and systems engineers frequently worked to remedy them on nights and weekends. Because Pure Storage oversees maintenance on its arrays, they are always up to date, making it unlikely that employees will need to work unplanned overtime in order to install emergency patches and upgrades.

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› **Better resiliency and lower overall organizational risk.** Customers told Forrester that being able to easily duplicate environments, either at a backup location or in the public cloud, makes their organizations more resilient. At the university, for example, the most recent backup image is never more than 1 hour old.

Costs. The organizations experienced the following risk-adjusted PV costs:

› **Costs for Pure Storage FlashArray hardware and ongoing maintenance and support, totaling $528,615.** Customers paid one-time fees for Pure Storage FlashArray hardware as well as fees every three years to renew their subscriptions to the Evergreen Storage Program.

Financial Summary

Investment In A Pure Storage FlashArray Storage
Solution For Forrester's Composite Organization
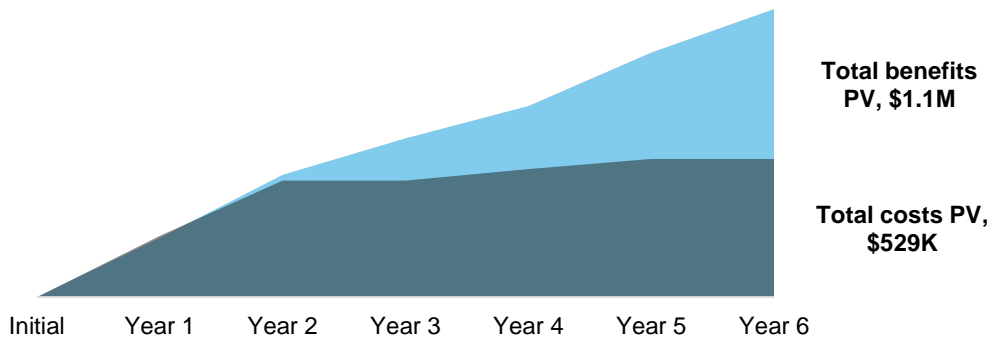
Total benefits PV, $1.1M

Total costs PV, $529K

| Initial | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |

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The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

TEI Framework And Methodology

From the information provided in the interviews and survey, Forrester has constructed a Total Economic Impact™ (TEI) framework for those organizations considering implementing a Pure Storage FlashArray storage solution.

The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision. Forrester took a multistep approach to evaluate the impact that a Pure Storage FlashArray storage solution can have on an organization:

DUE DILIGENCE
Interviewed Pure Storage stakeholders and Forrester analysts to gather data relative to Pure Storage FlashArray storage solutions.

CUSTOMER INTERVIEWS AND SURVEY
Interviewed four organizations and surveyed 36 organizations using Pure Storage FlashArray storage solutions to obtain data with respect to costs, benefits, and risks.

COMPOSITE ORGANIZATION
Designed a composite organization based on characteristics of the interviewed and surveyed organizations.

FINANCIAL MODEL FRAMEWORK
Constructed a financial model representative of the interviews and survey responses using the TEI methodology and risk-adjusted the financial model based on issues and concerns of the interviewed organizations.

CASE STUDY
Employed four fundamental elements of TEI in modeling the financial impact of a Pure Storage FlashArray storage solution: benefits, costs, flexibility, and risks. Given the increasing sophistication that enterprises have regarding ROI analyses related to IT investments, Forrester's TEI methodology serves to provide a complete picture of the total economic impact of purchase decisions. Please see Appendix A for additional information on the TEI methodology.

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by Pure Storage and delivered by Forrester Consulting. It is not meant to be used as a competitive analysis.

Forrester makes no assumptions as to the potential ROI that other organizations will receive. Forrester strongly advises that readers use their own estimates within the framework provided in the report to determine the appropriateness of an investment in a Pure Storage FlashArray storage solution.

Pure Storage 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.

Pure Storage provided the customer names for the interviews but did not participate in the interviews.

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The Pure Storage Customer Journey

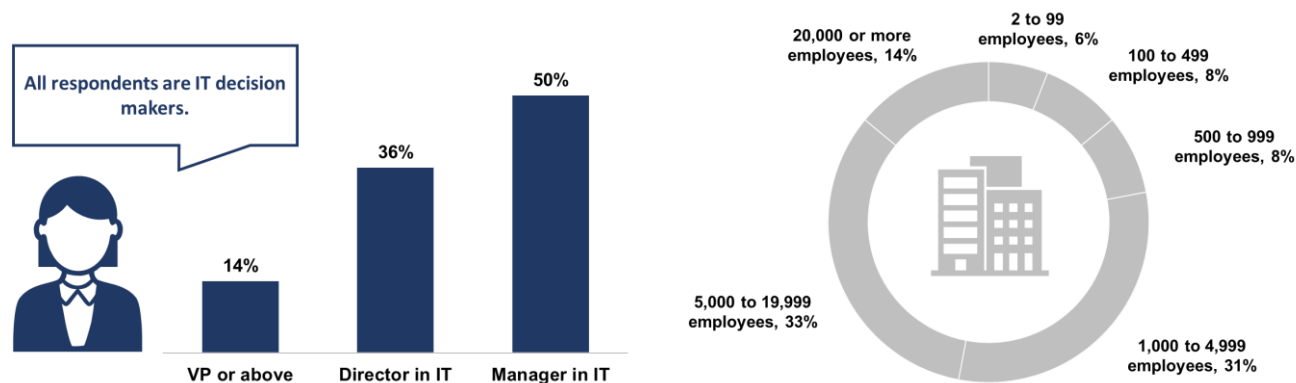**BEFORE AND AFTER THE PURE STORAGE FLASHARRAY INVESTMENT**

Interviewed Organizations

For this study, Forrester conducted four interviews with Pure Storage FlashArray customers. The following descriptions provide an overview of these customers:

INDUSTRY	REVENUE	INTERVIEWEE	STORAGE CAPACITY
Public sector/government	N/A	Infrastructure manager	36 TB
Education (university)	$30M	Assistant director of IT and infrastructure	15 TB
Healthcare technology	$1B	Senior systems engineer	90 TB
Professional services	$6.5B	VP global technology architecture	30 PB

Surveyed Organizations

For this study, Forrester also surveyed 36 IT decision makers at Pure Storage customer organizations around the world.

All respondents are IT decision makers.

14% VP or above
36% Director in IT
50% Manager in IT

2 to 99 employees, 6%
100 to 499 employees, 8%
500 to 999 employees, 8%
1,000 to 4,999 employees, 31%
5,000 to 19,999 employees, 33%
20,000 or more employees, 14%

Key Challenges

Customers described the following challenges, which motivated them to seek an alternative to their preexisting storage solutions.

› **Complicated storage upgrades and refreshes.** Prior to upgrading to a FlashArray storage solution, customers completed storage upgrades every three to five years. Setup took several days, during which time in-house systems engineers and outside systems integrators configured the arrays for use with third-party data center virtualization software and migrated data.

"The responsiveness of the applications makes you feel like you're in a quality organization, delivering a quality service."

Infrastructure manager, government organization

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> › **Significant amounts of downtime.** Prior to upgrading to FlashArray storage solutions, customer organizations planned for significant amounts of downtime each year. They also experienced significant amounts of unplanned downtime, owing to unanticipated storage hardware issues. The former was inconvenient for infrastructure teams, who performed system upgrades during off hours to avoid business disruption. However, it was the latter that posed a real problem for the broader organization, since outages could impact mission critical applications.

> › **Loss of systems and data.** Customers articulated how unplanned downtime, owing to storage hardware failures, could lead to significant business disruption. At the healthcare technology company, a storage failure rendered the primary business application unusable for approximately 40 hours, and the company's staff of 3,500 field engineers reverted to tracking their jobs on paper. When the application came back up, there were "countless" hours of catch-up work to be done, according to the senior systems engineer. A subsequent hardware failure, which took approximately 28 hours to resolve, led to the loss of several days of work.

> "Where we've really seen results are around downtime — we've been through two upgrade cycles with Pure Storage and there's no downtime."
>
> *Assistant director of IT and infrastructure, private university*

"What were the key drivers that led your organization to consider an investment in Pure Storage's FlashArray storage solution?"

(Select all that apply)
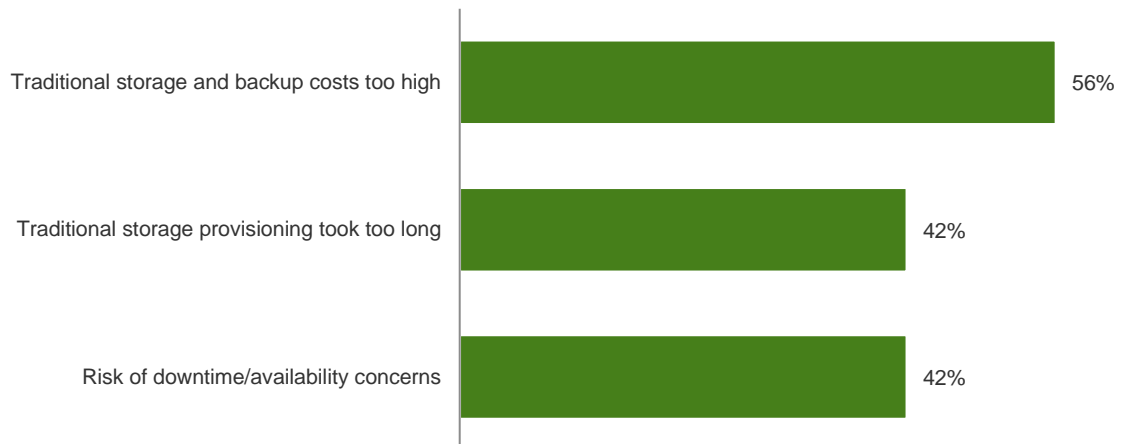
Traditional storage and backup costs too high	56%
Traditional storage provisioning took too long	42%
Risk of downtime/availability concerns	42%

Base: 36 Pure Storage FlashArray customers
Source: A commissioned study by Forrester Consulting on behalf of Pure Storage, June 2019

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Key Results

The interviews and survey data revealed that key results from the Pure Storage investment include:

› **Easy deployments and additions to capacity.** According to customers, a FlashArray storage solution can be deployed in several hours, as opposed to the several days that it took to deploy alternative storage solutions. After that, adding capacity is a straightforward task. The senior systems engineer at the healthcare company described the process as follows: "Adding capacity is incredibly simple, and when you compare it to the previous process, there are some very significant time savings. You don't even need a storage administrator or engineer to do it . . . anybody can do it."

› **No downtime for upgrades.** As part of the Evergreen Storage Program, Pure Storage manages firmware upgrades and patches for customers, delivering them in a way that avoids business disruption. The infrastructure manager for the government organization described the process as follows: "Support notifies you that there's an upgrade available, and you let them know what works for you. Then you get on the phone with a technician, and they upgrade one control at a time, while the others remain active and available. Everything stays up and available throughout the maintenance period."

› **Greater confidence in systems and resiliency.** Whereas before they upgraded to Pure Storage, organizations experienced several hardware failures that led to the loss of data, their FlashArray storage solutions enable the delivery of consistent, high-quality services.

"My favorite part about Pure Storage is that there is no downtime for maintenance, which we couldn't say about our previous vendor. With the previous vendor, we conducted maintenance on Sundays when our offices were closed, but it would still affect our online offering. Of course, we'd also need to spend the full Sunday at the office, where we'd shut all of the virtual machines down and apply firmware upgrades to all of the appliances."

Infrastructure manager, government organization

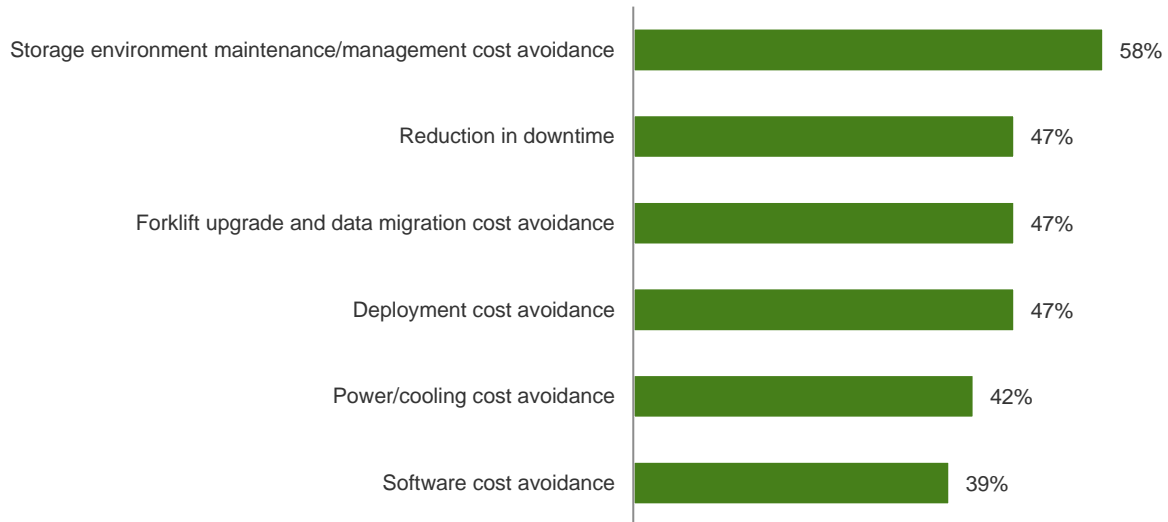"Support notifies you that there's an upgrade available, and you let them know what works for you. Then you get on the phone with a technician, and they upgrade one control at a time, while the others remain active and available. Everything stays up and available throughout the maintenance period. It's wonderful."

Infrastructure manager, government organization

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"What are the primary benefits of Pure Storage's FlashArray storage solutions to your organization?"

(Select all that apply)

Storage environment maintenance/management cost avoidance	58%
Reduction in downtime	47%
Forklift upgrade and data migration cost avoidance	47%
Deployment cost avoidance	47%
Power/cooling cost avoidance	42%
Software cost avoidance	39%

Base: 36 Pure Storage FlashArray customers
Source: A commissioned study by Forrester Consulting on behalf of Pure Storage, June 2019

"Which of the following additional benefits has the Pure Storage FlashArray storage solution delivered to your organization?"

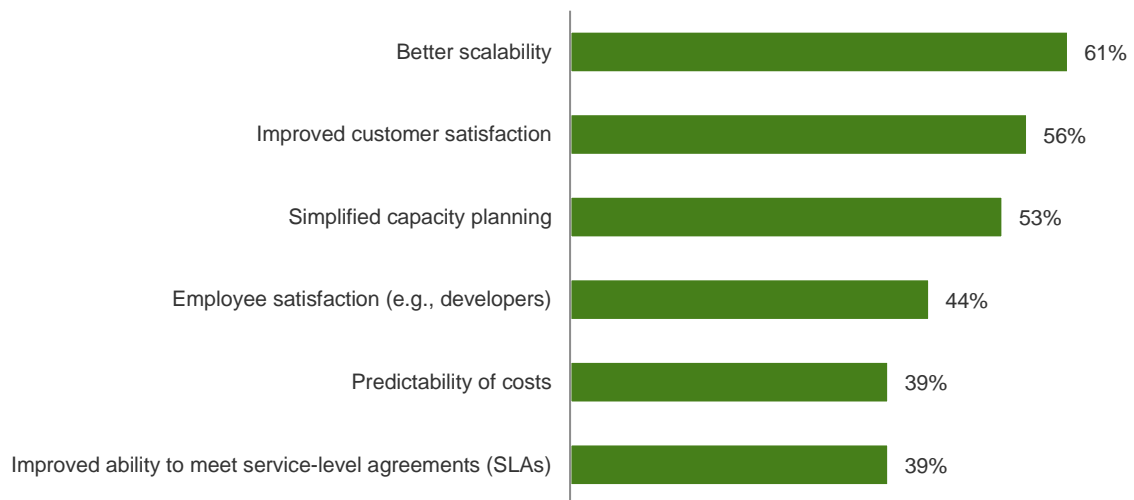|	
Better scalability	61%
Improved customer satisfaction	56%
Simplified capacity planning	53%
Employee satisfaction (e.g., developers)	44%
Predictability of costs	39%
Improved ability to meet service-level agreements (SLAs)	39%

Base: 36 Pure Storage FlashArray customers
Source: A commissioned study by Forrester Consulting on behalf of Pure Storage, June 2019

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Composite Organization

The composite organization is a midmarket company with $500 million in annual revenues. It has global teams and customers.

Prior to upgrading to a Pure Storage FlashArray storage solution, the composite organization utilized an HDD storage solution from a well-established vendor. It experienced both planned and unplanned downtime and dedicated several working days each year to firmware upgrades and patching exercises. Because the environment was unreliable and required a lot of oversight, the organization dedicated one employee (among an infrastructure team comprising six full-time employees) to managing the storage environment on a full-time basis.

At present, the organization uses two X20 storage arrays to support its core applications — i.e., those that enable its workforce to deliver core services to customers — as well as data analytics, financial, and enterprise information management (EIM) applications, among others.

› It purchased a 48 TB array (approximately 160 TB of effective capacity), which is located on-premises, in Year 1 of the analysis period.

› It purchased a 48 TB array (approximately 160 TB of effective capacity), which is located in a colocation facility, in Year 2 of the analysis period.

A single systems engineer dedicates 10% of its time to managing the Pure Storage FlashArray storage environment.

Key assumptions:
- Year 1 upgrade of on-premises environment
- Year 2 upgrade of storage environment at colocation facility

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Pure Storage Enterprise Customer Journey

The composite organization, which is outlined above and used to model the financial benefits of investing in the FlashArray storage solution, closely mirrors Pure Storage's small and medium-size customers. However, for this study, Forrester also collected in-depth feedback from a Pure Storage enterprise customer. This section outlines findings from the interview with the enterprise customer, whose investment and outcomes differ widely from Pure Storage's small-to-medium size customers.

The following metrics describe the enterprise customer's storage environment and infrastructure teams:

› 45 total data center locations across the US, Europe, and Asia.

› 30 PB of live storage.

› Approximately 1,000 individuals dedicated to infrastructure management.

The following table illustrates this customer's motivations for investing in a Pure Storage FlashArray storage solution as well as specific outcomes cited in the interview:

✅

Highlights:

- 45 total data centers
- 30 PB of live storage
- 1,000 individuals dedicated to infrastructure management worldwide

Challenges	Results
Before Pure Storage, the organization installed a new storage array every three to five years. The transition from the old array to the new one could take up to 18 months. "It was a big task for our storage team, and we had a much larger storage team back then as a result," said the VP of global technology architecture. What's more, in each upgrade cycle the organization was forced to buy a lot of components (e.g., chassis, power supplies, cables) that only needed to be replaced due to generational incompatibilities.	**No more forklift upgrades.** With Pure Storage, forklift upgrades aren't necessary, since newer hardware such as upgraded controllers can be added to existing arrays. There are no generational incompatibilities, and the organization doesn't need to repurchase newer versions of well-functioning components, such as flash media.
Provisioning the right tier of storage for the task was difficult. About three times each month, when developers began a new application build, they would submit a request for storage to a storage administrator. The storage administrator would respond with an extensive series of questions aimed at identifying the tier and amount of storage required. The back and forth could take 8 or 10 hours and, even then, storage was often provisioned incorrectly. When this happened, storage administrators upgraded developers to a higher tier of storage, but the infrastructure team absorbed the difference in cost.	**Storage provisioning is more automated and accurate.** The VP of global technology architecture described the process of provisioning storage with the Pure Storage FlashArray storage solution as follows: "Now, an admin goes into a console, clicks a button, and you have capacity. There's no more tiering, and there are fewer questions that need to be asked."
A complicated cost structure. With the organization's prior vendor, invoices were complicated and contained line items for hardware, components, and software, among other add-ons. What's more, it was difficult to predict maintenance costs, since vendors frequently raised fees as solutions aged to encourage upgrades.	**A simplified cost structure.** According to the VP of global technology infrastructure, invoices from Pure Storage typically show costs on one or two lines, which allows them to move quickly through procurement and finance.

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Enterprise Customer Benefits

› **A ten-to-one consolidation in data floor space.** The customer saw a 90% reduction in the amount of floor space required in its colocation facilities across the globe, which led to significant savings in colocation rack space costs.

› **Significant software cost savings.** According to the VP of global technology architecture, the organization sees millions of dollars in licensing and maintenance cost savings each year, owing to the software capabilities that Pure Storage packages with its arrays. Previously, the organization paid additional fees for encryption and replication software, among other software capabilities. With Pure Storage, all software capabilities, as well as future enhancements, are available to customers with current subscriptions to the Evergreen Storage Program.

› **Reduction in FTEs required to manage storage infrastructure.** Prior to upgrading to the Pure Storage FlashArray storage solution, the customer organization had 80 individuals dedicated to managing the storage environment; today, 16 individuals manage the 30 PB storage environment. According to the VP of global technology architecture, there are two primary reasons why the organization can manage the Pure Storage environment with a staff 25% of its previous size: 1) there are no more hardware failures to remediate and 2) Pure Storage manages much of the routine maintenance on the arrays as part of the enterprise maintenance contract. (Previously, the customer organization experienced two issues each week that it deemed high-severity or impacting mission critical systems and services.)

"We used to spend a whole weekend every month patching the storage array. Now, we can patch it on a Tuesday at 2 a.m. Pure Storage dials in. We'll monitor the update to make sure everything goes well. It's a complete change in operations and how we do patching."

VP of global technology architecture, professional services firms

"We had a power outage at one of our core regional data centers. There was an issue with the generator, and the whole data center went dark. When we finally got power back, our Pure Storage arrays came up immediately, but our spinning disk arrays didn't. They went into a data preservation mode until they finished a lengthy health check. We were locked out of those spinning disk arrays for about four days."

VP of global technology architecture, professional services firms

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Analysis Of Benefits

QUANTIFIED BENEFIT DATA AS APPLIED TO THE COMPOSITE ORGANIZATION

Total Benefits

REF.	BENEFIT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	TOTAL	PRESENT VALUE
Atr	Reduced effort to manage and maintain the storage environment	$105,300	$108,459	$111,713	$115,064	$118,516	$122,072	$681,124	$490,380
Btr	Reduced effort in storage deployment workflows	$5,700	$5,871	$0	$0	$46,515	$47,910	$105,997	$77,705
Ctr	Avoided training costs for new systems engineers	$0	$0	$9,500	$0	$9,500	$0	$19,000	$13,036
Dtr	Reduction in colocation facility rack space costs	$0	$37,706	$39,591	$41,570	$43,649	$45,831	$208,347	$142,273
Etr	Avoided capital expenses and maintenance costs	$138,600	$140,112	$24,192	$24,192	$110,884	$80,159	$518,139	$390,592
	Total benefits (risk-adjusted)	$249,600	$292,148	$184,996	$180,826	$329,064	$295,972	$1,532,606	$1,113,986

Reduced Effort To Manage And Maintain The Storage Environment

Customers told Forrester that their Pure Storage FlashArray storage solutions require significantly less time to manage than preexisting storage solutions, allowing them to dedicate full-time resources to other activities. The following tasks are among those for which customers reported time savings.

> The table above shows the total of all benefits across the areas listed below, as well as present values (PVs) discounted at 10%. Over six years, the composite organization expects risk-adjusted total benefits to be a PV of more than $1.1 million.

Patching/Upgrades

Prior to upgrading to a FlashArray storage solution, the interviewed organizations dedicated a significant amount of time to keeping their storage hardware up to date. To prevent disruption to business services, they scheduled downtime on nights and weekends, during which systems engineers worked overtime to install patches and upgrades. They also experienced several hardware failures each year, which prompted an immediate need to install patches and updates.

Customers told Forrester that Pure Storage manages — to a large extent — updates to their FlashArray storage solutions. Since there is no downtime associate with regular updates, they aren't disruptive to the business. Customers haven't experienced any unplanned downtime. The senior systems engineer for the healthcare technology company described the process as follows: "Not having to perform my own firmware updates saves a lot of time. I open up the transaction by turning on remote assistance, the Pure Storage technicians check in with me, and then they tell me when it's done. We schedule updates at least once a quarter."

> "Not having to perform my own firmware updates saves a lot of time. I open up the transaction by turning on remote assistance, the Pure Storage technicians check in with me, and then they tell me when it's done. We schedule updates at least once a quarter."
>
> *Senior systems engineer, healthcare technology company*

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Disaster Recovery

Customers reported being able to execute disaster recovery routines more quickly with Pure Storage FlashArray storage solutions than preexisting storage solutions.

Among the customers interviewed for this study, disaster recovery was particularly important to the university, since it is located in a region prone to natural disasters. According to the assistant director of IT and infrastructure, the organization saves at least 40 hours (or a full work week) each year in planning for and executing disaster recovery routines, owing to the performance improvements it saw with the upgrade to a FlashArray storage solution.

Data Backup And Recovery

Customers reported being able to back up and restore files and servers more quickly, owing to the performance improvements that their FlashArray storage solutions provide.

Whereas it previously took hours for some customers to back up and/or restore files and servers, they reported being able to complete these tasks in minutes, owing to the performance improvements they realized with their storage environment upgrades. According to the assistant director of IT and infrastructure at the university, file servers that previously took up to a half day to restore from backup can now be restored in as little as 8 minutes. (Forrester assumes that FTEs will not be actively engaged in backup and recovery processes 100% of the time, but that these tasks do consume FTE hours, since administrators need to start, stop, and monitor processes.)

Scheduling And Coordinating Downtime

Customers no longer dedicate significant amounts of time to coordinating and scheduling downtime for storage upgrades, owing to the nondisruptive manner in which Pure Storage delivers patches and upgrades.

Coordinating downtime across teams, applications, and time zones was challenging for several of the organizations interviewed for this study, but particularly so for the professional services firm. According to the VP of global technology architecture, the organization needed to coordinate maintenance windows across thousands of servers, which host applications with different uptime requirements and customers in different time zones. Planning for upgrades consumed a lot of time. Execution was also difficult: "Copying a petabyte of data from one array to another takes days. Because you don't have days' worth of maintenance windows, you have to do it in chunks and sometimes things come up and maintenance windows need to be canceled, which caused delays." Now, the organization schedules all of its maintenance each month for the same block of time. It doesn't need permission from other parts of the organization to execute upgrades, since none of the applications ever go offline or slow down.

"Adding capacity is incredibly simple, and when you compare it to the previous process, there are some very significant time savings. You don't even need a storage administrator or engineer to do it . . . anybody can do it."

Senior systems engineer, healthcare technology company

"Now, we don't even need a downtime window. We just inform someone that we're going to upgrade our server or patch it and we do it and nothing ever goes offline."

VP of global technology architecture, professional services firm

On average, survey respondents said that their organizations required 1.6 fewer FTEs to manage the storage environment after upgrading to a FlashArray storage solution.

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Provisioning Storage

Customers no longer dedicate time to identifying the right tier of storage in response to requests from applications developers. Prior to upgrading to a FlashArray storage solution, storage administrators at the professional services organization struggled to accurately provision storage for application developers. About three times each month, when developers began a new application build, they would submit a request for storage to a storage administrator. The storage administrator would respond with an extensive series of questions aimed at identifying the tier and amount of storage required. The back and forth could take 8 or 10 hours and, even then, storage was often provisioned incorrectly. When this happened, storage administrators upgraded developers to a higher tier of storage, but the infrastructure team absorbed the difference in cost.

With the FlashArray storage solution, this is no longer a concern. The VP of global technology architecture described the process of provisioning storage with the Pure Storage FlashArray storage solution as follows: "Now, an admin goes into a console, clicks a button, and you have capacity. There's no more tiering, and there are fewer questions that need to be asked."

For the composite organization, Forrester assumes the following:

› Prior to upgrading to a Pure Storage FlashArray storage solution, the composite organization dedicated one full-time employee to managing storage-related tasks.

› After upgrading to the FlashArray storage solution, storage-related tasks make up only 10% of this individual's workload, allowing them to focus on other tasks.

The following factors may impact other organizations' realization of this benefit category:

› The time IT infrastructure teams dedicate to the maintenance and management of preexisting storage solutions.

› The nature and complexity of the business, e.g., software firms will likely see more frequent requests for storage infrastructure, making it more advantageous for these firms to remove inefficiencies in the process of provisioning storage. Likewise, businesses that rarely develop new applications will realize less time savings in making this process more efficient.

To account for potential variability, Forrester adjusted this benefit downward by 10%, yielding a six-year, risk-adjusted total PV of $490,380.

> Impact risk is the risk that the business or technology needs of the organization may not be met by the investment, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for benefit estimates.

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	Reduced Effort To Manage And Maintain The Storage Environment: Calculation Table							
REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
A1	FTEs dedicated to storage environment management and maintenance prior to FlashArray investment		1	1	1	1	1	1
A2	FTEs dedicated to storage environment management and maintenance after FlashArray investment		0.10	0.10	0.10	0.10	0.10	0.10
A3	Senior systems engineer fully burdened annual salary	3% YoY increase/ Payscale.com	$130,000	$133,900	$137,917	$142,055	$146,316	$150,706
At	Reduced effort to manage and maintain the storage environment	(A1-A2)*A3	$117,000	$120,510	$124,125	$127,849	$131,685	$135,635
	Risk adjustment	↓10%						
Atr	Reduced effort to manage and maintain the storage environment (risk-adjusted)		$105,300	$108,459	$111,713	$115,064	$118,516	$122,072

Reduced Effort In Storage Deployment Workflows

Customers reported being able to complete a refresh of their storage environment more quickly and at a lower cost than in prior refresh cycles, owing to the simplicity of the initial setup for Pure Storage FlashArray storage solutions. Moving forward, they will also avoid time-consuming data migrations, since FlashArray storage solutions can be upgraded in a nondisruptive manner.

In prior years, storage teams spent significant amounts of time and money on initial setup of storage infrastructure:

› The government organization previously paid a third-party systems integrator to assist with the workload whenever it added capacity; during the previous upgrade cycle, it paid for two full days of support, in addition to the time its staff dedicated to the initial setup and configuration.

› The healthcare technology company also paid a third-party systems integrator for three days of work during its previous upgrade cycle; it also dedicated two full-time employees to the initial setup and configuration over that three-day period.

Customers reported being able to quickly and easily configure their FlashArray storage solutions. For example, the healthcare technology company put the timeline for initial setup and configuration at approximately 2 hours.

For the composite organization, Forrester assumes the following:

› By choosing a FlashArray storage solution, instead of a storage solution that requires more extensive setup, the composite organization avoids setup and installation costs in Year 1 and Year 2 when it refreshes the storage environment on-premises and at its colocation facility, respectively. In Year 5 and Year 6, when it would normally refresh each of these environments once again, it avoids the costs associated with deploying new storage infrastructure.

Customers reported being able to quickly and easily configure their FlashArray storage solutions. For example, the healthcare technology company put the timeline for initial setup and configuration at approximately 2 hours.

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› In Year 5 and Year 6, the composite organization avoids data migration costs associated with a typical storage upgrade, since its FlashArray storage solution can be upgraded in a nondisruptive manner (see B7 and B8).

The extent to which organizations rely on third-party contractors to complete storage environment upgrades may introduce variability into this benefit model.

To account for potential variability, Forrester adjusted this benefit downward by 5%, yielding a six-year, risk-adjusted total PV of $77,705.

Reduced Effort In Storage Deployment Workflows: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
B1	FTE hours required to complete storage environment refresh with legacy storage solution		48	48			48	48
B2	Senior systems engineer fully burdened hourly rate	$130,000/2,080 hours in Year 1	$62.50	$64.38			$70.35	$72.46
B3	Total cost of FTE hours to complete storage environment refresh	B1*B2	$3,000	$3,090			$3,377	$3,478
B4	System integrator hours required to complete storage environment refresh with legacy storage solution		24	24			24	24
B5	System integrator hourly rate	Interviews	$125.00	$128.75			$140.69	$144.91
B6	Total cost of time for system integrator to complete storage environment refresh	B4*B5	$3,000	$3,090			$3,377	$3,478
B7	Total FTE hours required for data migration	Assumption	0	0			360	360
B8	Total FTE hours required for planning and remediating issues during data migration	Assumption	0	0			240	240
B9	Senior systems engineer fully burdened hourly rate		$62.50	$64.38			$70.35	$72.46
B10	Total avoided cost of time for planning and data migration	(B7+B8)*B9	$0	$0			$42,210	$43,476
Bt	Reduced effort in storage deployment workflows	B3+B6+B10	$6,000	$6,180			$48,963	$50,432
	Risk adjustment	↓5%						
Btr	Reduced effort in storage deployment workflows (risk-adjusted)		$5,700	$5,871			$46,515	$47,910

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Avoided Training Costs For New Systems Engineers

Customers reported being able to more quickly train new systems engineers on the Pure Storage FlashArray storage solution than preexisting storage solutions.

Interviewees told Forrester that their preexisting storage solutions were cumbersome to manage, and that it could take months for a qualified systems engineer to get up to speed on the environment. During that time, new hires weren't as productive, and they required support from others on infrastructure teams.

Customers reported finding it easier to: 1) hire storage systems engineers with relevant skill sets and 2) train newly hired systems engineers to manage their storage environments. They attributed both of these benefits to the simplicity of their FlashArray storage solutions. For the composite organization, Forrester assumes the following:

› The average tenure for a systems engineer is 24 months.

› If the composite organization were to use a more complex storage solution, new hires would require a more lengthy training period, during which they would be significantly less productive.

› In Year 3 and Year 5, the composite organization avoids the cost of diminished productivity during training periods for new systems engineers, owing to the ease with which new hires learn the Pure Storage FlashArray storage solution.

The following factors may impact other organizations' realization of this benefit category:

› The rate of turnover for systems engineers.

› The skill sets and existing experience of newly-hired systems engineers.

To account for potential variability, Forrester adjusted this benefit downward by 5%, yielding a six-year, risk-adjusted total PV of $13,036.

Customers reported finding it easier to: 1) hire systems engineers with relevant skillsets and 2) train new hires to manage their storage environments.

Avoided Training Costs For New Systems Engineers: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
C1	New hires (systems engineers)				1		1	
C2	Training period (weeks)				8		8	
C3	Productivity rate during training period				50%		50%	
C4	Senior systems engineer fully burdened hourly rate	$130,000/2,080 hours in Year 1			$62.50		$62.50	
Ct	Avoided training costs for systems engineers	C1*C2*C3*C4*40 hours	$0	$0	$10,000	$0	$10,000	$0
	Risk adjustment	↓5%						
Ctr	Avoided training costs for systems engineers (risk-adjusted)		$0	$0	$9,500	$0	$9,500	$0

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Reduction In Colocation Facility Rack Space Costs

By switching to Pure Storage FlashArray storage solutions, customers were able to fit more storage into smaller physical spaces. For those that utilized colocation facilities, this translated into a reduction in operational costs.

For example, upon upgrading to a Pure Storage FlashArray storage solution, the healthcare company eliminated an entire rack at its colocation facility, leading to approximately $24,000 in annual savings.

For the composite organization, Forrester assumes the following:

› The composite organization purchased a 48 TB FlashArray storage solution in Year 2 of the analysis period, which it placed at its colocation facility.

› 60% fewer rack units are required at the colocation facility, owing to the higher density of the FlashArray storage solution.

The following factors may impact other organizations' realization of this benefit category:

› The density and utilization levels of preexisting storage solutions.

› The geographic location of the colocation facility. (Monthly rates for colocation rack space differ based on geographic location.)

To account for potential variability, Forrester adjusted this benefit downward by 5%, yielding a six-year, risk-adjusted total PV of $142,273.
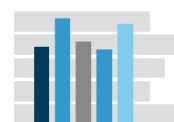
The healthcare company eliminated an entire rack at its colocation facility, leading to approximately $24,000 in annual savings.

Reduction In Colocation Facility Rack Space Costs: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
D1	Monthly cost per data center rack	5% annual increase	$0	$2,205	$2,315	$2,431	$2,553	2,680
D2	Monthly cost per rack unit (rounded)	35 rack units per rack	$0	$63	$66	$69	$73	$77
D3	Total rack units required with legacy storage solution		87.5	87.5	87.5	87.5	87.5	87.5
D4	Projected total rack unit cost for legacy storage solution	D2*D3*12	$0	$66,150	$69,458	$72,930	$76,577	$80,406
D5	Total rack units required with Pure Storage FlashArray solution		0	35	35	35	35	35
D6	Projected total rack unit cost for Pure Storage FlashArray solution	D2*D5*12	$0	$26,460	$27,783	$29,172	$30,631	$32,162
Dt	Reduction in colocation facility rack space costs	D4-D6	$0	$39,690	$41,675	$43,758	$45,946	$48,243
	Risk adjustment	↓5%						
Dtr	Reduction in colocation facility rack space costs (risk-adjusted)		$0	$37,706	$39,591	$41,570	$43,649	$45,831

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Avoided Capital Expenses And Maintenance Costs

By choosing a FlashArray storage solution, customers avoided upfront and ongoing costs associated with alternative storage solutions. (Costs for the Pure Storage FlashArray solution are reflected in the section titled Analysis Of Costs.)

For the composite organization, Forrester assumes the following:

› In Year 1, the composite organization avoids the cost of refreshing its on-premises storage environment with a hybrid storage solution from a competing vendor. In Year 2, the composite organization avoids the cost of refreshing the storage environment at its colocation facility with a hybrid storage solution from a competing vendor.

› In Year 5, the composite organization avoids the cost of refreshing its on-premises storage environment with a hybrid storage solution from a competing vendor. In Year 6, the composite organization avoids the cost of refreshing the storage environment at its colocation facility with a hybrid storage solution from a competing vendor.

› Avoided maintenance costs for hybrid storage solutions are estimated at 10% of avoided cumulative investment storage hardware.

› Costs for storage hardware decline at an annual rate of 8% over the period of analysis.

Changes in the price of storage over the period of analysis, which make it more or less expensive to upgrade with an alternative solution in Years 5 and 6, may lead to variability in this model. To account for potential variability, Forrester adjusted this benefit downward by 10%, yielding a six-year, risk-adjusted total PV of $390,592.

Customers reported that they needed to buy 75% less raw capacity from Pure Storage, owing to higher density and data reduction ratios for FlashArray storage solutions.

Avoided Capital Expenses And Maintenance Costs: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
E1	Avoided storage environment refresh costs	Assumes 8% YoY reduction in storage costs	$140,000	$128,800	$0	$0	$100,295	$71,851
E2	Avoided hardware maintenance costs for **Year 1** hardware investment	**Year 1** avoided costs* 10% maintenance	$14,000	$14,000	$14,000	$14,000	Year 1 hardware retired	
E3	Avoided hardware maintenance costs for **Year 2** hardware investment	**Year 2** avoided costs* 10% maintenance		$12,880	$12,880	$12,880	$12,880	Year 2 hardware retired
E4	Avoided hardware maintenance costs for **Year 5** hardware investment	**Year 5** avoided costs* 10% maintenance					$10,030	$10,030
E5	Avoided hardware maintenance costs for **Year 6** hardware investment	**Year 6** avoided costs* 10% maintenance						$7,185
Et	Avoided capital expenses and maintenance costs	E1+E2+E3+E4+E5	$154,000	$155,680	$26,880	$26,880	$123,205	$89,065
	Risk adjustment	↓10%						
Etr	Avoided capital expenses and maintenance costs (risk-adjusted)		$138,600	$140,112	$24,192	$24,192	$110,884	$80,159

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Unquantified Benefits

Customers reported the following benefits of upgrading to a Pure Storage FlashArray storage solution, which were not quantified as part of the financial analysis for this study.
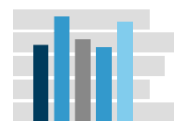
› **Improved service delivery.** Several customers told Forrester that their investment in a FlashArray storage solution enabled them to deliver higher quality services to their organizations. For example, the assistant director of IT and infrastructure at the university reported a noticeable improvement in performance of student and faculty applications, owing to simultaneous upgrades to the organization's storage environment and networking infrastructure.

› **Improved employee experience.** Prior to upgrading to a FlashArray storage solution, hardware issues were common, and systems engineers frequently worked to remedy them on nights and weekends. Because Pure Storage oversees maintenance on its arrays, they are always up to date, making it unlikely that employees will need to work unplanned overtime to install emergency patches and upgrades.

› **Better resiliency and lower overall organizational risk.** Customers told Forrester that being able to easily duplicate environments, either at a backup location or in the public cloud, makes their organizations more resilient. At the university, for example, the most recent backup image is never more than 1 hour old.

Flexibility

Customers discussed multiple scenarios in which they expect to see even greater value in the future as a result of their investments in a Pure Storage FlashArray storage solution:

› **Easier utilization of public cloud resources.** Customers told Forrester that Pure Storage plug-ins for VMware and major public cloud services will make it easier to utilize public cloud resources and enable them to choose the right storage option for each type of data that they store.

› **Easier use of clustering for high-availability applications.** The senior systems engineer at the healthcare technology company reported that the organization is researching the use of clustering — the orchestration of multiple storage resources to improve reliability and performance — for high-availability applications. While other vendors do enable clustering, the process is much easier with Pure Storage, the interviewee told Forrester.

Flexibility would also be quantified when evaluated as part of a specific project (described in more detail in Appendix A).

Several customers told Forrester that their investment in a FlashArray storage solution enabled them to deliver higher quality services to their organizations.

Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could be turned into business benefit for a 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.

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Analysis Of Costs

QUANTIFIED COST DATA AS APPLIED TO THE COMPOSITE ORGANIZATION

	Total Costs								
REF.	**COST**	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**	**YEAR 6**	**TOTAL**	**PRESENT VALUE**
Ftr	Costs for Pure Storage FlashArray hardware and ongoing maintenance and support	$257,250	$257,250	$0	$63,000	$63,000	$0	$640,500	$528,615
Gtr	Cost of internal effort dedicated to ongoing operations and support	Cost of ongoing effort to manage storage environment is subtracted from the benefit total in the section titled Reduced Effort To Manage And Maintain Storage Environment.							
	Total costs (risk-adjusted)	$257,250	$257,250	$0	$63,000	$63,000	$0	$640,500	$528,615

Costs For Pure Storage FlashArray Hardware And Ongoing Maintenance And Support

Customers paid one-time fees for Pure Storage FlashArray hardware as well as fees every three years to renew their subscriptions to the Evergreen Storage Program.

Pure Storage provided Forrester with cost estimates, and Forrester confirmed these estimates with the Pure Storage FlashArray customers interviewed for this study.

For the composite organization, Forrester assumes the following:

› In Year 1, the composite organization purchases a 48 TB X20 array to upgrade its on-premises storage environment. In Year 2, it purchases a 48 TB X20 array to upgrade the storage environment at its colocation facility.

› In Years 1 and 4, the composite organization pays Evergreen Storage Program subscription fees to support its on-premises storage environment. In Years 2 and 5, it pays Evergreen Storage Program subscription fees to support the storage environment at its colocation facility.

Since the costs shown reflect costs provided by Pure Storage and confirmed with customers, no risk adjustment is applied to this cost category. Six-year, PV Evergreen Storage Program costs total $528,615.

The table above shows the total of all costs across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the composite organization expects risk-adjusted total costs to be a PV of approximately $530,000.

Customers pay flat maintenance rates in perpetuity and receive upgraded controllers every three years for the duration of their subscription.

Implementation risk is the risk that a proposed investment may deviate from the original or expected requirements, resulting in higher costs than anticipated. The greater the uncertainty, the wider the potential range of outcomes for cost estimates.

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Costs For Pure Storage FlashArray Hardware And Ongoing Maintenance And Support: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
F1	Pure Storage FlashArray costs	Year 1 upgrade for on-premises environment; Year 2 upgrade for environment at colocation facility	$185,000	$185,000				
F2	Pure Storage flash array maintenance and support costs		$60,000	$60,000		$60,000	$60,000	
Ft	Costs for Pure Storage FlashArray hardware and ongoing maintenance and support	F1+F2	$245,000	$245,000	$0	$60,000	$60,000	$0
	Risk adjustment	↑5%						
Ftr	Costs for Pure Storage FlashArray hardware and ongoing maintenance and support (risk-adjusted)		$257,250	$257,250	$0	$63,000	$63,000	$0

Cost Of Internal Effort Dedicated To Ongoing Operations And Support

The cost of ongoing effort to manage and enhance the Pure Storage FlashArray storage environment is subtracted from the benefit total in the section titled Reduced Effort To Manage And Maintain Storage Environment.

› Forrester assumes that the composite organization dedicated one FTE to managing the preexisting storage solution.

› After upgrading to the FlashArray storage solution, only 10% of one FTE's time is required to manage the storage environment.
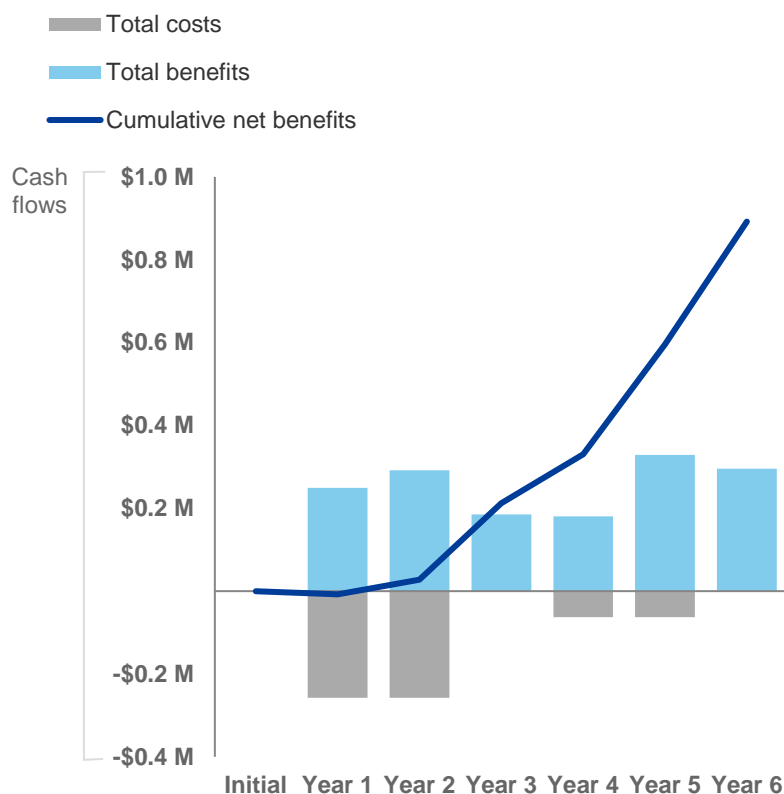
Customers reported dedicating minimal time to maintenance and support of their Pure Storage FlashArray storage solutions.

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Financial Summary

CONSOLIDATED SIX-YEAR RISK-ADJUSTED METRICS

Cash Flow Chart (Risk-Adjusted)

- Total costs
- Total benefits
- Cumulative net benefits

The financial results calculated in the Benefits and Costs sections can be used to determine the ROI, NPV, and payback period for the composite organization's investment. Forrester assumes a yearly discount rate of 10% for this analysis.

These risk-adjusted ROI, NPV, and payback period values are determined by applying risk-adjustment factors to the unadjusted results in each Benefit and Cost section.

Cash Flow Table (Risk-Adjusted)

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	TOTAL	PRESENT VALUE
Total costs	($257,250)	($257,250)	$0	($63,000)	($63,000)	$0	($640,500)	($528,615)
Total benefits	$249,600	$292,148	$184,996	$180,826	$329,064	$295,972	$1,532,606	$1,113,986
Net benefits	($7,650)	$34,898	$184,996	$117,826	$266,064	$295,972	$892,106	$585,371
ROI								111%
Payback period								<6 months

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Pure Storage Pure Storage: Overview

The following information is provided by Pure Storage. Forrester has not validated any claims and does not endorse Pure Storage or its offerings.

Pure Storage is dedicated to helping organizations deliver the value of their data — their most valuable asset — consistently, quickly, and to every user and application that needs it. Pure Storage's unique combination of storage tools, solutions and flexible business models are designed to evolve, standardize, and optimize, at implementation and into the future, all while protecting storage investments and increasing organizational agility.

Pure Storage launched the all-flash array revolution. FlashArray offers flexibility and consistent fast performance, while providing 99.9999% proven availability for mission-critical applications. FlashBlade arrays allow creation of a data hub with elastic performance and concurrency, delivering performance no matter the workload. Pure1 cloud-based storage management is powered by the META artificial intelligence engine, which helps customers automate data management and maximize their IT investments in the cloud and on-premises at their fingertips.

And underlying all of our products is our unique concept of Evergreen Storage. Evergreen combines an architecture that is designed to be upgraded and expanded modularly, without downtime or performance impacts, with a business model that protects your storage investment. Evergreen enables you to simply subscribe to a storage experience that keeps getting better and more agile with age. You can buy your storage once, upgrade, modernize and expand it as needed, without any disruption and without rebuying any terabytes you already own.

Effortless acceleration and consolidation for all your workloads, comprehensive data protection, true hybrid cloud operations, and an agile architecture and business model. That's Pure.

Appendix A: Total Economic Impact

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.

Total Economic Impact Approach

Benefits represent the value delivered to the business by the product. The TEI methodology places 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.

Costs consider all expenses necessary to deliver the proposed value, or benefits, of the product. The cost category within TEI captures incremental costs over the existing environment for ongoing costs associated with the solution.

Flexibility represents the strategic value that can be obtained for some future additional investment building on top of the initial investment already made. Having the ability to capture that benefit has a PV that can be estimated.

Risks measure the uncertainty of benefit and cost estimates given: 1) the likelihood that estimates will meet original projections and 2) the likelihood that estimates will be tracked over time. TEI risk factors are based on "triangular distribution."

The initial investment column contains costs incurred at "time 0" or at the beginning of Year 1 that are not discounted. All other cash flows are discounted using the discount rate at the end of the year. PV calculations are calculated for each total cost and benefit estimate. NPV calculations in the summary tables are the sum of the initial investment and the discounted cash flows in each year. Sums and present value calculations of the Total Benefits, Total Costs, and Cash Flow tables may not exactly add up, as some rounding may occur.

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 NPV of cash flows.

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.

Return on investment (ROI)

A project's expected return in percentage terms. ROI is calculated by dividing net benefits (benefits less costs) by costs.

Discount rate

The interest rate used in cash flow analysis to take into account the time value of money. Organizations typically use discount rates between 8% and 16%.

Payback period

The breakeven point for an investment. This is the point in time at which net benefits (benefits minus costs) equal initial investment or cost.

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Appendix B: Supplemental Material

Related Forrester Research

"The Total Economic Impact™ Of Pure Storage For SaaS Providers," a commissioned study conducted by Forrester Consulting on behalf of Pure Storage, April 2018.

"The Total Economic Impact™ Of Pure Storage Evergreen Storage Subscriptions," a commissioned study conducted by Forrester Consulting on behalf of Pure Storage, April 2017.

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