A Forrester Total Economic Impact™ Study

Commissioned By Pure Storage

Project Director:
Bob Cormier

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The Total Economic Impact™ Of Pure Storage FlashArray FA-400 Series Storage Solutions

Cost Savings And Business Benefits Attributed To Pure Storage

FORRESTER®

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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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Executive Summary

In the summer of 2014, Pure Storage commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study to examine the potential return on investment (ROI) enterprises may realize by deploying Pure Storage FlashArray FA-400 Series storage solutions. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of Pure Storage within their organizations.

Quantified benefit categories of Pure Storage FA-400 Series FlashArrays
(risk- and present value-adjusted over three years)

- **Business benefits — $1,284,614.**
- **Simplification of deployment and management tasks savings — $171,150.**
- **Simplification — storage health checks - cost avoidance savings — $22,762.**
- **Data center rack space cost avoidance savings — $238,036.**
- **Power and cooling savings — $85,719.**
- **Software license and maintenance — cost avoidance savings — $106,364.**

To better understand the benefits, costs, and risks associated with an investment in Pure Storage, Forrester conducted in-depth interviews with four Pure Storage customers. For a brief description of each customer, see the Analysis section. According to Pure Storage, its FlashArray FA-400 Series is an economical all-flash storage solution for virtually any workload. Purity is the Pure Storage operating environment built from the ground up for flash. Purity is provided at no additional cost with every FlashArray and runs consistently across the entire FlashArray hardware family. For more details on the Pure Storage solution, see Appendix A.

Forrester created a composite *Organization* to describe the TEI of Pure Storage. This composite *Organization* is a global, midmarket ($100 million to $1 billion) enterprise that distributes and services its products. It is headquartered and has operations in North America with multisite operations in EMEA and APAC. Forrester has projected costs and benefits over three years in this study. For more information, see the section titled: The Composite *Organization.*

PURE STORAGE'S SOLUTION PROVIDED SIGNIFICANT CAPITAL AND OPERATIONAL COST SAVINGS

Our interviews and subsequent financial analysis found that the composite *Organization* experienced the risk-adjusted ROI, benefits, and costs shown in Figure 1.

The analysis points to risk-adjusted benefits of $1,908,644 over three years versus implementation and operating costs of $946,792, equating to a net present value (NPV) of $961,852. The risk-adjusted ROI was a very favorable 102%.

FIGURE 1
Financial Summary Showing Three-Year Risk-Adjusted Results

ROI: 102%	Benefits PV: $1,908,644	Costs PV: $946,792	NPV: $961,852

Source: Forrester Research, Inc.

Though the price per raw gigabyte (GB) of flash storage is more expensive than hard drive storage, a growing number of use cases have developed where the performance, resiliency, and ROI of flash can outweigh the higher acquisition costs. This is due to data reduction features such as deduplication and compression where the usable per GB cost is the same or less expensive in almost all use cases except for low data reduction applications such as video. The four interviewed customers reported that Pure Storage FlashArrays had a major beneficial impact on the infrastructure operations of their organizations. In addition, the performance benefits of Pure Storage FA-400 Series have business benefits that transcend the data center and have a positive impact on the *Organization*. The following are the benefits quantified in this case study:

› **Total benefits associated with Pure Storage FlashArray FA-400 Series storage solutions — $1,908,644.** The *Organization* experienced the following benefits (risk- and present value-adjusted) over three years (further detailed in the Benefits: Quantified section):

- Business benefits — $1,284,614.
- Simplification of deployment and management tasks savings — $171,150.
- Simplification — storage health checks — cost avoidance savings — $22,762.
- Data center rack unit cost avoidance savings — $238,036.
- Power and cooling savings — $85,719.
- Software license and maintenance — cost avoidance savings — $106,364.

› **Costs associated with Pure Storage — $946,792.** The *Organization* experienced the following costs (present value-adjusted) over three years (further detailed in the Costs section):

- Planning and deploying Pure Storage — $5,384. This is the labor associated with planning and deploying the solution.
- Pure Storage costs —- $924,000
- Professional services and training — $0 (zero dollars). No professional services or training is required.
- Ongoing labor to manage Pure Storage — $17,408.

If the risk-adjusted NPV of costs and benefits still demonstrates a compelling business case, it raises confidence that the investment is likely to succeed because the risks that threaten the project have been taken into consideration and quantified. The risk-adjusted numbers should be taken as “realistic” expectations, as they represent the expected values considering risk. Assuming normal success at mitigating risk, the risk-adjusted numbers should more closely reflect the expected outcome of the investment.

Disclosures

The reader should be aware of the following:

› The 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 return on investment that other organizations will receive. Forrester strongly advises that readers use their own estimates within the framework provided in the study to determine the appropriateness of an investment in Pure Storage.

› Pure Storage reviewed and provided feedback to Forrester, but Forrester maintained editorial control over the study and its findings and did not accept changes to the study that contradict Forrester’s findings or obscure the meaning of the study.

› The interviewed customers’ names were provided by Pure Storage. Pure Storage did not participate in the interviews.

TEI Framework And Methodology

INTRODUCTION

From the information provided in the interviews, Forrester has constructed a Total Economic Impact (TEI) framework for those organizations considering investing in Pure Storage. The objective of the framework is to identify the benefits, costs, flexibility, and risk factors that affect the investment decision.

APPROACH AND METHODOLOGY

Forrester employed four fundamental elements of TEI in modeling Pure Storage: benefits, costs, flexibility, and risks.

Forrester took a multistep approach to evaluate the impact that Pure Storage can have on the composite *Organization* (see Figure 2). Specifically, we:

- Interviewed Pure Storage marketing, sales, and product management personnel, along with Forrester storage analysts, to better understand the value proposition for Pure Storage.
- Conducted in-depth interviews with each of the four customers to obtain data with respect to costs, benefits, and risks.
- 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.
- Risk-adjusted the financial model based on issues and concerns the customers raised in the interviews. Risk adjustment is a key part of the TEI methodology. While the interviewed customers provided cost and benefit estimates, some categories included future projections or a broad range of responses, or had a number of internal or external forces that might have impacted costs and benefits higher or lower. For that reason, each benefit has been risk-adjusted and is detailed in the Benefits: Quantified section.

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 B for additional information on the TEI methodology.

FIGURE 2
TEI Approach

Source: Forrester Research, Inc.

Analysis

INTERVIEWED CUSTOMERS

Forrester derived its conclusions in large part from information received in a series of in-depth interviews we conducted with executives and personnel at four customers, each of which had deployed Pure Storage's FlashArray FA-400 Series storage solutions in production for between six and 10 months. The following is a brief description of the interviewed customers, all of which were promised anonymity:

- A US-based cloud-based software-as-a-service (SaaS) business applications company with about $100 million in annual revenues. It has been using four Pure Storage FA-420 arrays for nine months. Previously, it had FA-320 hardware. It is using Pure Storage for the following environments: VMware, virtual desktop infrastructure (VDI), Oracle database, and SQL Server database. Forrester interviewed the vice president of IT and a senior IT manager.
- A US-based $200 million provider of solutions to research markets. It has been using one Pure Storage FA-420 array for Oracle database reporting and one FA-320 array for test and development for nine months. Forrester interviewed the director of IT, infrastructure, and operations.
- A warehousing and logistics company with over 2,000 employees and based and operating in the US. It purchased two FA-420s 10 months ago for its VMware and SQL server environments. Forrester interviewed the manager of technical services.
- A multibillion-dollar global financial services company. It has invested in six FA-420 arrays deployed in its VMware and VDI environments. Forrester interviewed the director of storage management.

THE COMPOSITE ORGANIZATION

The composite *Organization* is a global, midmarket ($100 million to $1 billion) enterprise that manufactures, distributes, and services its products. It is headquartered and has operations in North America. It has been using Pure Storage for one year to support storage needs in the following environments: VMware, VDI, Oracle database, and SQL Server database.

The performance requirements of the *Organization's* virtualization platforms and enterprise applications are rapidly increasing, which has forced its data center and storage administrators to rethink their storage environments with a goal of accelerating the technology transition from hard drives to flash-based storage.

After a review process evaluating several vendors, the *Organization* selected Pure Storage FA-420 arrays (two arrays), as it believes Pure Storage can satisfy the following business challenges, goals, and objectives:

- **Capex cost reduction.** The *Organization* was adding additional virtual host servers and storage capacity to circumvent the performance degradation and inefficiencies in its legacy storage area network (SAN). The goal was to find a new solution to support the *Organization's* growing virtual environment at a lower overall capital cost and without sacrificing performance.
- **Opex cost reduction.** The *Organization* wanted to reduce costs for power and cooling and the following administrative tasks: initial storage deployment, growing and shrinking volumes, monitoring capacity and performance, managing hosts and host groups, and managing snapshots.
- **Simplicity.** Storage administration must be simpler than its legacy storage for both implementation and ongoing administration.
- **Latency.** It needed predictable submillisecond latency for its applications. Its legacy storage had unacceptably high latency ranging from 12 milliseconds to 25 milliseconds.

- **Performance.** Its legacy mechanical spinning disk storage was becoming increasingly slow and unable to keep up with growing performance demands.
- **Resiliency.** Its next storage system had to include nondisruptive features for capacity expansion, controller upgrades, and software updates, keeping data safe, secure, and available without performance loss.

The *Organization* invested in the following Pure Storage solutions that should satisfy its storage growth needs for the next three years:

- FA-420-34TB (34TB raw, 125+ TB effective capacity) FlashArray and includes Premium Support (4-hour on-site hardware replacement).
- FA-420-11TB (11TB raw, 40+ TB effective capacity) FlashArray and includes Premium Support (4-hour on-site hardware replacement).

According to Pure Storage, the FA-420 array continues to be the center of the FlashArray family, suitable for accelerating consolidated applications with up to 125+ TB of usable space. The FA-420 can be nondisruptively upgraded to an FA-450 system as a customer's capacity or performance needs increase. The FA-400s can also be nondisruptively upgraded to Pure Storage's next-generation systems in the future, in the same fashion that the FA-320 was upgradable to the FA-420 when it became available on the market.

BENEFITS: QUANTIFIED

Though performance is the main goal that organizations have when they deploy flash storage, the interviewed customers found economic validation for their investment in a variety of ways. This is a key point to keep in mind since some of the customers Forrester interviewed found great value in specific areas, such as rack space and power savings. Other customers found that this benefit was relatively insignificant compared with other benefits, such as the capital expense savings and the ease of use of Pure Storage's Purity operating system. One customer cited the ability to meet service-level agreements (SLAs) and avoidance of costly penalties or the loss of business, which would not have been possible without flash storage. Forrester was able to quantify the following six benefit categories.

Business Benefits With Pure Storage FA-400 Series FlashArrays

Pure Storage customers had at least one example of incremental business benefits associated with Pure Storage. Here are some of the examples:

- A faster overnight refresh of its data mart using Pure Storage FlashArrays. There was a need to shrink that overnight window so its Asia offices could run reports during their business hours. The refresh window was reduced from over 3 hours (legacy storage) to 82 minutes with Pure Storage.
- Payroll for one company running 250 transactions at a time when it used to be 30 at a time, an eightfold improvement.
- Large SQL jobs running in seven days with Pure Storage and taking one month with legacy disk storage.
- Online analytical processing (OLAP) cube data array analysis used for faster time-to-market was a 36-hour operation with legacy disk storage; with Pure Storage it takes only 90 minutes.
- Faster product development and cycles, for example, cloning an Oracle database in 30 seconds instead of 5 minutes.

> *"A faster storage array means faster applications and better performance, allowing us to provide more competitive offerings to our customers in the markets we serve."*
>
> ~Vice president of IT, cloud-based SaaS business applications company

› Ability to have four times the number of users on a system to help drive more business.

The common theme was that Pure Storage is "faster," so rather than exponentially calculating the above examples, Forrester will quantify a business benefit associated with faster time-to-market for product development and incremental gross profit.

The *Organization* routinely develops new products. Since investing in Pure Storage, product development employees' productivity has improved significantly. Previously, the legacy disk storage was seen as the key bottleneck that slowed down the product development processes.

In its product development environments, the enhanced performance of Pure Storage reduced product development and software compile times, allowing employees' hours of additional productive time in their workday. In these business intelligence use cases, Pure Storage is the catalyst that accelerates analytics processing, giving the *Organization* access to faster insights to its product development activities. The reduction of processing time also allows teams to run more reports and test and refine multiple theories before making key business decisions on new products.

For our composite *Organization*, it is now able develop new products faster than with previous legacy storage solutions — on average, two and a half months faster. There are two benefits that Forrester will quantify:

› The *Organization*'s seven-person development team is now able to complete work on two more new products each year.

› Faster time-to-market results in an incremental two and a half months of revenue and gross profit for each new product initiated by the *Organization*.

The total business benefits from using Pure Storage have been conservatively risk-adjusted (reduced) by 50% in Table 1 to reflect the uncertainty of consistently achieving three years of benefits. See the section on Risks for more detail.

TABLE 1
Business Benefits Of Pure Storage FA-400 Series FlashArrays

Ref.	Metric	Calc./Source	Year 1	Year 2	Year 3	Total
A1	Development team — incremental products delivered each year	Interviews	2	2	2	-
A2	Average annual revenue associated with each new incremental product	Interviews	$950,000	$950,000	$950,000	$2,850,000
A3	Product gross margin percent	Industry average	45%	45%	45%	-
A4	Total gross profit dollars	A1*A2*A3	$855,000	$855,000	$855,000	$2,565,000
A5	Faster time-to-market by 2.5 months	Interviews	2.5	2.5	2.5	-
A6	2.5 months faster time-to-market — incremental gross profit dollars	(A4/12)*A5	$178,125	$178,125	$178,125	$534,375
At	Total business benefits from using Pure Storage	A4+A6	$1,033,125	$1,033,125	$1,033,125	$3,099,375
	Risk adjustment	↓50%				
Atr	Total business benefits (risk-adjusted)	At-50%	$516,563	$516,563	$516,563	$1,549,688

Source: Forrester Research, Inc.

Opex Cost Reduction — Simplification Of Deployment And Management Tasks Savings

The *Organization* achieved immediate expense savings, as no professional services or training was needed for the initial deployment of Pure Storage FlashArrays. The interviewed customers credited the simplicity of the Purity operating environment.

A small amount of flash capacity can handle the performance load of dozens of drives that represent more potential points of failure within a disk array. With fewer components to worry about, the interviewed customers told Forrester that Pure Storage FlashArrays overall were easier to maintain than hard disks and have less redundant array of independent disks (RAID) rebuild operations, which typically lead to performance degradation, downtime, and administrative labor to remedy.

In addition, there were storage administrative savings in the following ongoing tasks: growing and shrinking volumes, monitoring capacity and performance, managing hosts and host groups, managing snapshots, and performing periodic health checks (I/O and latency) on the storage environment. The savings came from the following two categories:

- **No professional services or training needed to deploy Pure Storage FlashArrays.** Interviewed customers cited the simplicity of deploying (and managing) Pure Storage FlashArrays. None of the customers required or needed professional services or formal training to deploy the Pure Storage Flash Arrays. In Year 1, the *Organization* saved $30,000 in professional services and training cost avoidance, representing costs associated with a comparable initial deployment of hard disk storage.
- **Simplification of storage management tasks.** The *Organization* is able to save half a full-time equivalent (FTE) with Pure Storage due to the simplicity of the following tasks: growing and shrinking volumes, monitoring capacity and performance, managing hosts and host groups, managing snapshots, and having fewer RAID rebuild operations. At a fully loaded annual cost of $140,000 (senior storage administrator), the *Organization* saves half an FTE, or $70,000 per year, or $210,000 over three years. Although attrition savings were not quantified for this study, interviewed customers predicted attrition savings, i.e., future replacements of storage administrators could be more junior than predecessors due to the simplicity of Pure Storage, saving up to $30,000 annually in salary and benefits per administrator.

The labor savings benefits have been risk-adjusted (reduced) by 15% in Table 2 to reflect how long it may take to redeploy administrators to other tasks or positions in the *Organization*. See the section on Risks for more detail.

TABLE 2
Simplification Of Deployment And Management Tasks Savings

Ref.	Metric	Calc./Source	Year 1	Year 2	Year 3	Total
B1	No professional services or training needed to deploy Pure Storage FlashArrays	Interviews	$30,000	$0	$0	$30,000
B2	Simplification of storage management tasks using Pure Storage — FTEs saved	Interviews	0.5	0.5	0.5	-
B3	Annual cost per storage administrator (fully loaded)	Industry average (US)	$140,000	$140,000	$140,000	-
B4	FTE savings due to simplification	B2*B3	$70,000	$70,000	$70,000	$210,000
Bt	Total benefits	B1+B4	$100,000	$70,000	$70,000	$240,000
	Risk adjustment	↓15%				
Btr	Total benefits (risk-adjusted)	Bt-15%	$85,000	$59,500	$59,500	$204,000

Source: Forrester Research, Inc.

› **Storage health checks.** The *Organization* used to do lengthy health checks on the legacy storage environment, capturing seven days' worth of I/O and latency data and analyzing it. This health check process took 40 hours every quarter (160 hours annually). With Pure Storage, the storage administrator is able to look at the Purity operating system dashboard and immediately see current status data on I/O and latency, eliminating the quarterly health check process. At a fully loaded annual cost of $140,000 ($67.30 hourly), total annual savings is $10,768 (160 hours*$67.30), or $32,304 over three years.

The labor savings benefits have been risk-adjusted (reduced) by 15% in Table 2 to reflect how long it may take to redeploy administrators to other value-added tasks in the *Organization*. See the section on Risks for more detail.

TABLE 3
Simplification — Storage Health Checks — Cost Avoidance Savings

Ref.	Metric	Calc./Source	Year 1	Year 2	Year 3	Total
C1	Storage health check — legacy hours (quarterly)	Interviews	40	40	40	-
C2	Annual legacy hours (four quarters)	C1*4	160	160	160	-
C3	Hourly cost per storage administrator (fully loaded)	Industry average (US)	$67.30	$67.30	$67.30	-
C4	Cost avoidance benefits of using Pure Storage	C2*C3	$10,768	$10,768	$10,768	$32,304
Ct	Total storage health check benefits	C4	$10,768	$10,768	$10,768	$32,304
	Risk adjustment	↓15%				
Ctr	Total storage health check benefits (risk-adjusted)	Ct-15%	$9,153	$9,153	$9,153	$27,458

Source: Forrester Research, Inc.

Capital Expense Savings With Pure Storage FA-400 Series FlashArrays — Rack Unit Costs

Previous to investing in Pure Storage, the *Organization* had been adding additional virtual host servers and storage capacity to circumvent the performance degradation and inefficiencies in its legacy SAN. The goal was to find a new solution to support the *Organization's* growing virtual environment at a lower overall capital cost and without sacrificing performance.

› The *Organization* replaced its legacy storage arrays with the following Pure Storage solutions with enough capacity to satisfy its storage growth for three years:

- FA-420-34TB (34TB raw, 125+ TB effective capacity) FlashArray.
- FA-420-11TB (11TB raw, 40+ TB effective capacity) FlashArray.

Interviewed customers reported that Pure Storage FlashArrays were less costly on a dollar/GB useable capacity basis than the sub-$5 per GB that is the average cost for performance disk. The use case is contrasted with a traditional Fibre Channel 15K SAN array, and also taking Pure Storage's deduplication and compression features into account. Depending on the use case, Pure Storage customers told Forrester they could boost storage efficiency with primary storage deduplication and/or compression. The interviewed customers reported the following data reductions results:

› Two customers reported 3-5:1 and 6:1 for virtual server environments, including VMware or Hyper-V, consolidated virtual server environments with mixed applications.

› Three customers reported 4.1:1 and 4:1 and 6.1:1 for database environments for online transaction processing (OLTP) or OLAP.

› Two customers reported 10-14:1 and 10:1 for virtual desktop (VDI), both persistent and nonpersistent.

Forrester Research note: While the raw price of flash storage continues to drop, all-flash arrays are still costly on a raw GB-per-dollar basis. As a result, storage administrators should focus on performance-sensitive applications first, where the dollar per input/output operations per second (IOPS) and dollar per GB are in favor of all-flash arrays versus hard drives. As seen in Figure 3, the dollar per IOPS is only 48 cents for solid-state disk — compared with $3.50 per IOPS for hard drives, which means buyers would have to spend approximately 7.3 times more to get equivalent IOPS performance.

Table 4 outlines the data center rack unit cost savings when using Pure Storage FA-420 FlashArrays when compared with legacy disk storage. Some of the assumptions include a 15% annual growth in storage requirements, a $75 per month cost per data center rack unit (RU), and total legacy disk rack units that were required to match the same performance provided by Pure Storage FA-420 FlashArrays.

Capital expense savings were variable among the interviewed customers based on volume and other discounts provided by Pure Storage. Due to this variability, this benefit was risk-adjusted (reduced) by 10% in Table 4. See the section on Risks for more detail.

TABLE 4
Data Center Rack Space Cost Avoidance Savings

Ref.	Metric	Calc./Source	Year 1	Year 2	Year 3	Total
D1	Monthly cost per data center rack unit	Industry average	$75	$75	$75	-
D2	Total rack units required — legacy storage (15% annual growth)	Interviews	119.00	137.85	157.38	-
D3	Projected total rack unit cost — legacy storage	D1*D2*12	$107,100	$123,165	$141,640	$371,905
D4	Total rack units required — Pure Storage (15% annual growth)	Pure Storage	16.00	18.40	21.16	-
D5	Projected total rack unit cost — Pure Storage	D1*D4*12	$14,400	$16,560	$19,044	$50,004
D6	Total cost avoidance savings using Pure Storage	D3-D5	$92,700	$106,605	$122,596	$321,901
	Risk adjustment	🡻10%				
Dtr	Total cost avoidance savings using Pure Storage (risk-adjusted)	Dt-10%	$83,430	$95,945	$110,336	$289,711

Source: Forrester Research, Inc.

Power And Cooling Savings

Interviewed customers reported significant power and cooling savings when they replaced legacy disk storage with Pure Storage FlashArrays. For the *Organization*, power and cooling savings totaled $104,327 over three years and assumes a cost per KWH for power of $0.14 and a cost or KWH for cooling of $0.10 (see Table 5). We have risk-adjusted the savings downward by 7% to reflect regional KWH rate differentials.

TABLE 5
Power And Cooling Savings

Ref.	Metric	Calc./Source	Year 1	Year 2	Year 3	Total
E1	Power and cooling costs — legacy disk	Interviews	$37,563	$43,197	$49,677	$130,437
E2	Power and cooling costs — Pure Storage	Interviews	$5,258	$6,046	$6,953	$18,257
E3	Power and cooling savings with Pure Storage	E1-E2	$32,305	$37,151	$42,724	$112,180
Et	Total power and cooling savings	E3	$32,305	$37,151	$42,724	$112,180
	Risk adjustment	↓7%				
Etr	Power and cooling savings (risk-adjusted)	Et-7%	$30,044	$34,550	$39,733	$104,327

Source: Forrester Research, Inc.

Software License And Maintenance — Cost Avoidance Savings

The Pure Storage Purity 4.0 operating environment provides the following at no additional cost, saving interviewed customers software license and maintenance costs (see Table 6):

- FlashReduce — array-based deduplication, compression, pattern removal, and thin provisioning.
- FlashProtect — nondisruptive everything, RAID-3D, always-on encryption, and >99.999% availability.
- FlashRecover— array-based snapshots, replication, and protection policies.
- Management simplicity — web GUI, CLI, and REST API — for automated management.
- Microsoft VSS Provider — for snapshot-based protection of MS applications.

Table 6 lists the four software applications that can be avoided by using the Pure Storage Purity 4.0 operating environment and FlashArray FA-400 series. We have risk-adjusted the cost avoidance savings downward by 10% to take into account the variability of software vendors' discounts.

TABLE 6
Software License And Maintenance — Cost Avoidance Savings

Ref.	Metric	Calc./Source	Year 1	Year 2	Year 3	Total
F1	Real-time analytics software licenses and maintenance	Industry average	$26,500	$0	$0	$26,500
F2	Multipathing software licenses and maintenance	Industry average	$21,000	$0	$0	$21,000
F3	Snapshot and cloning software	Industry average	$34,500	$0	$0	$34,500
F4	Replication software licenses and maintenance	Industry average	$48,000	$0	$0	$48,000
Ft	Total cost avoidance savings	F1+F2+F3+F4	$130,000	$0	$0	$130,000
	Risk adjustment	↓10%				
Ftr	Total cost avoidance savings (risk-adjusted)	Ft-10%	$117,000	$0	$0	$117,000

Source: Forrester Research, Inc.

Total Benefits

Table 7 shows the total of all benefits as well as present values (PVs) discounted at 10%. Over three years, the *Organization* expects risk-adjusted total benefits to be a PV of $1,908,644.

TABLE 7
The *Organization* — Total Quantified Benefits (Risk-Adjusted)

Ref.	Metric	Year 1	Year 2	Year 3	Total	Present Value
Atr	Business benefits of Pure Storage FA-400 Series FlashArrays	$516,563	$516,563	$516,563	$1,549,688	$1,284,614
Btr	Simplification of deployment and management tasks — savings with Pure Storage	$85,000	$59,500	$59,500	$204,000	$171,150
Ctr	Simplification — storage health checks — cost avoidance benefits of Pure Storage	$9,153	$9,153	$9,153	$27,458	$22,762
Dtr	Data center unit space savings — cost avoidance benefits of Pure Storage	$83,430	$95,945	$110,336	$289,711	$238,036
Etr	Power and cooling savings with Pure Storage	$30,044	$34,550	$39,733	$104,327	$85,719
Ftr	Software license and maintenance — cost avoidance savings	$117,000	$0	$0	$117,000	$106,364
Ttr	Total quantified benefits (risk-adjusted)	$841,189	$715,710	$735,285	$2,292,184	$1,908,644

Source: Forrester Research, Inc.

BENEFITS: UNQUANTIFIED

The interviewed customers identified the following additional benefits of using Pure Storage but were not able to quantify the benefits at the present time:

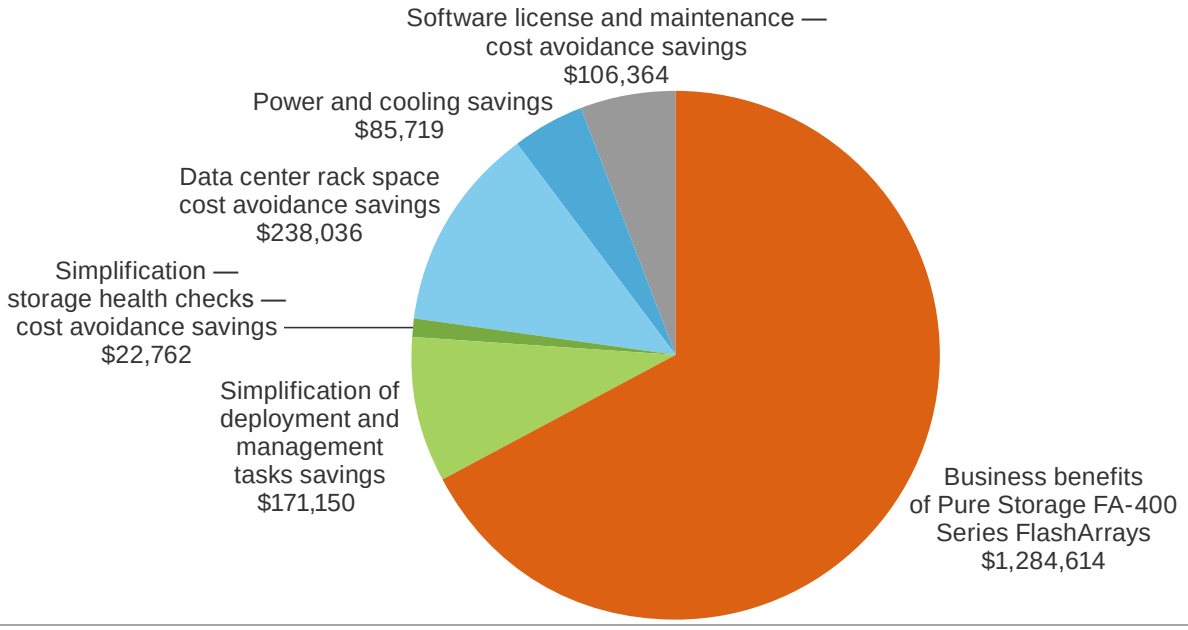
› Interviewed customers, citing the simplicity of Pure Storage, reported less administrative labor risk using Pure Storage. Previously, legacy disk storage administration was being done by only one or two senior administrators, which was viewed as higher risk in the case of sickness or departures. Contrast that with the administration of Pure Storage, which can be shared across several less experienced IT staff due to its simplicity.

› Interviewed customers predicted future attrition savings, i.e., future replacements of storage administrators could be more junior than predecessors due to the simplicity of Pure Storage, saving up to $30,000 annually in salary and benefits per administrator.

› Other business benefits of Pure Storage from Forrester's independent research include:

- Increased output from processing more transactions in the same time window.
- Reduced application latency.
- Cost avoidance of any penalties or fines.
- Faster and more reliable backups.

FIGURE 3
Quantified Benefits By Category (Risk- And Present Value-Adjusted) Totaling $1,908,644



COSTS

Costs Associated With Pure Storage

The *Organization* incurred costs in the following categories associated with Pure Storage:

- **Planning and deploying Pure Storage.** The internal labor associated with planning and implementing the Pure Storage FlashArray solutions totaled 80 hours across three IT staff (server administrator, storage administrator, and network administrator). The average fully loaded cost per IT staff is $140,000 ($67.30 hourly) for a total labor cost of $5,384 (80 hours*$67.30) as an initial investment period expense.
- **Pure Storage costs.** The *Organization* will incur the following Pure Storage costs totaling $924,000 in the initial investment year (see Appendix A for more information about Pure Storage):
  - FA-420-34TB (34TB raw, 125+ TB effective capacity) FlashArray and includes premium support (4-hour on-site hardware replacement).
  - FA-420-11TB (11TB raw, 40+ TB effective capacity) FlashArray and includes premium support (4-hour on-site hardware replacement).
- **Professional services and training.** The four interviewed customers reported that deploying Pure Storage FlashArrays did not require any vendor or partner professional services or training costs. Therefore, there are zero dollars associated with this cost category (Forrester has captured this cost avoidance in the Benefits: Quantified section).
- **Ongoing operations.** The *Organization* requires a storage administrator to spend an average of 2 hours per week maintaining and enhancing the Pure Storage FlashArrays. At an average fully loaded cost per hour of $67.30, the total cost for ongoing operations is $7,000 annually, or $21,000 over this three-year analysis.

Table 8 shows the total of all costs as well as associated present values, discounted at 10%. Over three years, the *Organization* expects costs to total $950,384 with a present value of $946,792. Forrester chose to not risk-adjust costs because the *Organization* received fixed price quotes for Pure Storage products and services.

TABLE 8
The *Organization* — Total Costs Associated With Pure Storage

Ref.	Metric	Initial	Year 1	Year 2	Year 3	Total	Present Value
H1	Planning and deploying Pure Storage	$5,384	$0	$0	$0	$5,384	$5,384
H2	Pure Storage costs	$924,000	$0	$0	$0	$924,000	$924,000
H3	Professional services and training*	$0	$0	$0	$0	$0	$0
H4	Ongoing labor to manage Pure Storage	$0	$7,000	$7,000	$7,000	$21,000	$17,408
Ht	Total costs	$929,384	$7,000	$7,000	$7,000	$950,384	$946,792

*No professional services or training was required by the interviewed customers to deploy and use Pure Storage FlashArrays.

Source: Forrester Research, Inc.

FLEXIBILITY OPTIONS

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 (or option) to engage in future initiatives but not the obligation to do so.

As with the interviewed customers, the *Organization* is in the early stages of adopting the solution; therefore, it was unable to experience and quantify Pure Storage's Forever Flash future flexibility option. However, each interviewed customer indicated it would take advantage of Pure Storage's Forever Flash features in coming years.

According to Pure Storage, its Forever Flash is a different approach to storage acquisition life cycles and is included in every FlashArray purchase. Pure Storage describes it as follows:

Fresh Every Upgrade

- With any upgrade to the array (controller upgrade or shelf addition), maintenance on the entire array can be reset to the then-current first-year maintenance rates. As long as the array is growing, customers will never be charged for increased out-year maintenance and will also realize a typical reduction in per-TB maintenance rates over time. When the array upgrade is processed, customers will be given credit for whatever maintenance term is remaining on the array to purchase a new contract as if the entire array was brand new — at the then-current rates.

Free Every Three

- Designed for arrays that aren't growing over time, Free Every Three allows customers to receive a controller upgrade when renewing their fourth- and fifth-year maintenance. Continuing down this maintenance path, customers would be eligible again when renewing their seventh- and eighth-year maintenance; your eligibility is based on another upgrade every three years when renewing two-plus years of maintenance. This enables customers to keep their FlashArray fast with new controllers designed to run the latest Purity software, including all the new features they are capable of, and has been acquired through an opex model.

The value of flexibility is clearly unique to each customer, and the measure of its value varies from organization to organization. For the purpose of this analysis, we have assumed that the *Organization* sees future value in being able to take advantage of the above flexibility options. The value of the flexibility option, when calculated, is based on the Black-Scholes Option Pricing formula. (For information regarding the flexibility calculation, please see Appendix B.)

RISKS

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 Pure 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 customer may not be met by the investment in Pure Storage, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for cost and benefit estimates.

While the interviewed customers provided cost and benefit estimates, some categories included future projections or a broad range of responses, or had a number of internal or external forces that might have impacted costs and benefits higher or lower. For that reason, each benefit has been risk-adjusted and is detailed in the Benefits: Quantified section. See Table 9 for a summary of risk adjustments by benefit category.

Note: Forrester chose to not risk-adjust costs because the *Organization* had received fixed price quotes for Pure Storage fees.

TABLE 9
Benefit And Cost Risk Adjustments

Benefit categories	Adjustment
Business benefits	↓50%
Simplification of deployment and management tasks savings	↓15%
Simplification — storage health checks — cost avoidance savings	↓15%
Data center rack unit cost avoidance savings	↓10%
Power and cooling savings	↓7%
Software license and maintenance — cost avoidance savings	↓10%
Costs	**Adjustment**
(Costs were not risk-adjusted)	↑0%

Source: Forrester Research, Inc.

Highlighting risk by adjusting the benefits produces 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.

The following implementation risk that could affect costs is identified as part of this analysis:

› Pure Storage FlashArray and maintenance costs. Although Forrester did not risk-adjust FlashArray and maintenance costs, other organizations' costs may vary due to variable discounts.

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

› Each interviewed customer had less than a year of experience with Pure Storage FlashArrays; therefore, there's some risk associated with Forrester projecting three years of benefits in our study.

The following risk was cited by each interviewed customer and did not affect the cost and benefit risk adjustments:

› There is a perception on the part of the interviewed customers that Pure Storage (the company) is an acquisition target. It's impossible to predict the impact of an acquisition of Pure Storage by another company; therefore, Forrester did not include cost or benefit adjustments related to this perceived risk. Interviewed customers are concerned that a potential suitor would not continue Pure Storage's product road map, which each customer viewed in a favorable and positive light.

Table 9 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.

Financial Summary

The financial results calculated in the Benefits and Costs sections can be used to determine the ROI, NPV, and payback period for the *Organization's* investment in Pure Storage.

Table 10 below shows the risk-adjusted ROI, NPV, and payback period values. The cost and benefit values are from summary Tables 7 and 8.

TABLE 10
Cash Flow: Risk-Adjusted

	Initial	Year 1	Year 2	Year 3	Total	Present Value
Costs	($929,384)	($7,000)	($7,000)	($7,000)	($950,384)	($946,792)
Benefits	$0	$841,189	$715,710	$735,285	$2,292,184	$1,908,644
Net benefits	($929,384)	$834,189	$708,710	$728,285	$1,341,800	$961,852
ROI						102%
Payback period						14 months

Source: Forrester Research, Inc.

The ROI was a very favorable 102%. If risk-adjusted costs, benefits, and ROI still demonstrate a compelling business case, it raises confidence that the investment is likely to succeed because the risks that threaten the project have been taken into consideration and quantified. The risk-adjusted numbers should be taken as "realistic" expectations, as they represent the expected value considering risk. Assuming normal success at mitigating risk, the risk-adjusted numbers should more closely reflect the expected outcome of the investment.

Appendix A: About Pure Storage FlashArray FA-400 Series: Overview

According to Pure Storage, its FlashArray FA-400 Series is an economical all-flash storage solution for virtually any workload. Purity is a storage operating environment built from the ground up for flash. Purity is provided at no additional cost with every FlashArray and runs consistently across the entire FlashArray hardware family. There are three main services of Purity: FlashReduce Data Reduction, FlashProtect (resiliency), and FlashRecover (including replication), as described below:

› **FlashReduce Data Reduction.** Pure Storage FlashArray automatically implements the following results, features, and functionality:

- 4-6:1 — virtual server environments including VMware or Hyper-V, consolidated virtual server environments with mixed applications.
- 2-4:1 — database environments for OLTP or OLAP.
- 6-10+:1 — virtual desktop (VDI), both persistent and nonpersistent.
- Pattern removal — identifies and removes repetitive binary patterns, including zeroes. In addition to capacity savings, pattern removal reduces the volume of data to be processed by the dedupe scanner and compression engine.
- Adaptive, inline deduplication — High-performance, inline deduplication with 512-byte granularity ensures only unique blocks of data are stored on flash, even for data sets that cannot be reduced by traditional fixed block dedupe implementations.
- Inline Compression — Inline Compression encodes data with a lightweight Lempel-Ziv-Oberhumer (LZO) lossless algorithm that uses less capacity than the original format. Coupled with Deep Reduction, compression reliably delivers 2 to 4X data reduction.
- Deep Reduction — A patent-pending form of the Huffman encoding algorithm is employed as part of Pure Storage's continuous optimization process to further reduce storage consumption. This deeper compression can increase savings on data that was compressed inline.
- Copy Reduction — Leveraging the data reduction engine, Purity provides instant, prededuplicated copies of data for snapshots, clones, replication, and xCopy commands. Copying data on a FlashArray only involves metadata.

› **FlashProtect's resiliency.** This keeps data safe, secure, and available without performance loss and includes the following features and functionality:

- Nondisruptive capacity expansion — Capacity can be expanded by adding another storage shelf to an existing array via SAS cabling.
- Nondisruptive controller upgrades (performance expansion) — The FlashArray features clustered stateless controllers, where no persistent information is stored within the controllers, simplifying both HA and upgrades.
- Nondisruptive hardware replacement — The FlashArray was designed with at least two of everything and no single point of failure, allowing for online maintenance or replacement of any failed component.
- Nondisruptive software updates — Because of the dual-controller, stateless design of the FlashArray, software can be nondisruptively upgraded without ever failing a host IO.
- All with zero performance impact — Although the IO handling of the FlashArray is active/active from all ports on both controllers, the array's performance is limited to one controller. This enables all maintenance operations to be performed with zero performance loss.

› **FlashRecover including replication (introduced April 2014).** Data Reduction-Optimized Backup and Disaster Recovery. Recover instantly from an extended library of thousands of space-efficient, point-in-time local or remote copies.

Protect between data centers or centralize backup and disaster recovery with flexible multisite protection. Features and functionality include:

- Instantly snapshot any volume. Snapshot any volume or group of volumes in the array at the click of a mouse. There is no planning involved, no reservations are required, and there is no performance overhead.
- Snapshots are just new volumes, with full capabilities. All volumes in the FlashArray are virtual and independent, so mount, read, write, or snapshot against your snapshot — no restrictions. All volumes and snapshots have full performance.
- Snapshots are always full, yet space-saving. In traditional arrays, choosing snapshots versus clones is a tough decision. In the FlashArray, all snapshots function like full clones, but they are always thin, deduped, and compressed.
- Recover anything to anywhere. With FlashRecover Snapshots, gone are the snapshot chain limitations and rigid recovery rules. Instantly recover any volume from any other volume or snapshot in the array — no data copying required. And all recoveries include an automated failback recovery snapshot of the original, just in case.

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, flexibility, and risks.

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.

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. However, having the ability to capture that benefit has a PV that can be estimated. The flexibility component of TEI captures that value.

RISKS

Risks measure 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 a minimum, three values are calculated to estimate the underlying range around each cost and benefit.

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 organizations 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 NPV of cash flows.

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.

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. PV calculations are calculated for each total cost and benefit estimate. NPV calculations are not calculated until the summary tables are the sum of the initial investment and the discounted cash flows in each year.

TABLE [EXAMPLE]
Example Table

Ref.	Metric	Calc./Source	Year 1	Year 2	Year 3

Source: Forrester Research, Inc.

FRAMEWORK ASSUMPTIONS

Table 11 provides the model assumptions that Forrester used in this analysis.

TABLE 11
Model And Case Study Assumptions

Ref.	Metric	Calc./Source	Value
J1	Annual cost per storage administrator (fully loaded)	US industry average	$140,000
J2	Annual cost per server administrator (fully loaded)	US industry average	$140,000
J3	Annual cost per network administrator (fully loaded)	US industry average	$140,000
J4	Hourly cost per administrators (fully loaded)	US industry average	$67.30

Source: Forrester Research, Inc.

The discount rate used in the PV and NPV calculations is 10%, and the 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 department to determine the most appropriate discount rate to use within their own organizations.