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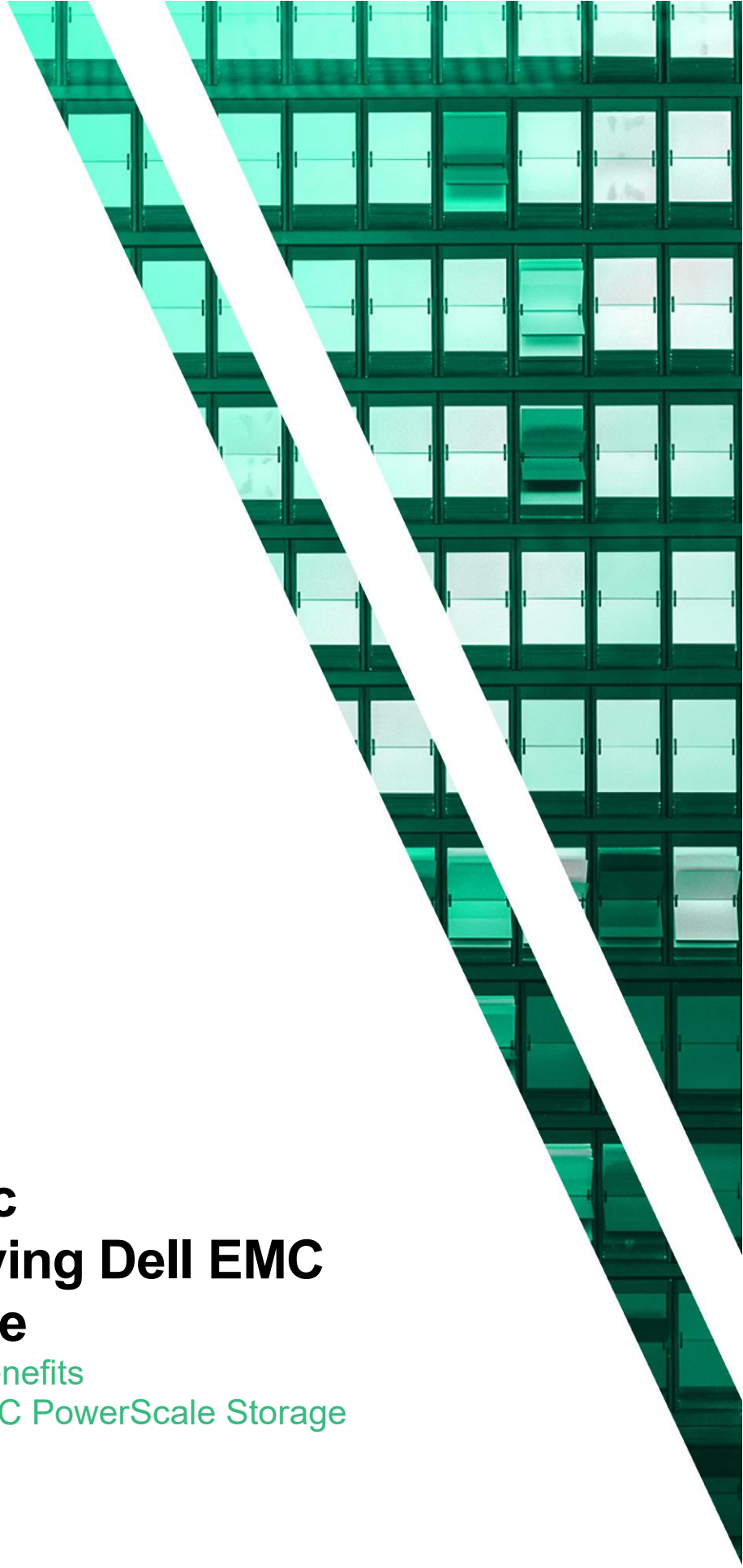

The Total Economic Impact™ Of Deploying Dell EMC PowerScale Storage

Cost Savings And Business Benefits Enabled By Deploying Dell EMC PowerScale Storage

SEPTEMBER 2021

A FORRESTER TOTAL ECONOMIC IMPACT™ STUDY COMMISSIONED BY DELL TECHNOLOGIES

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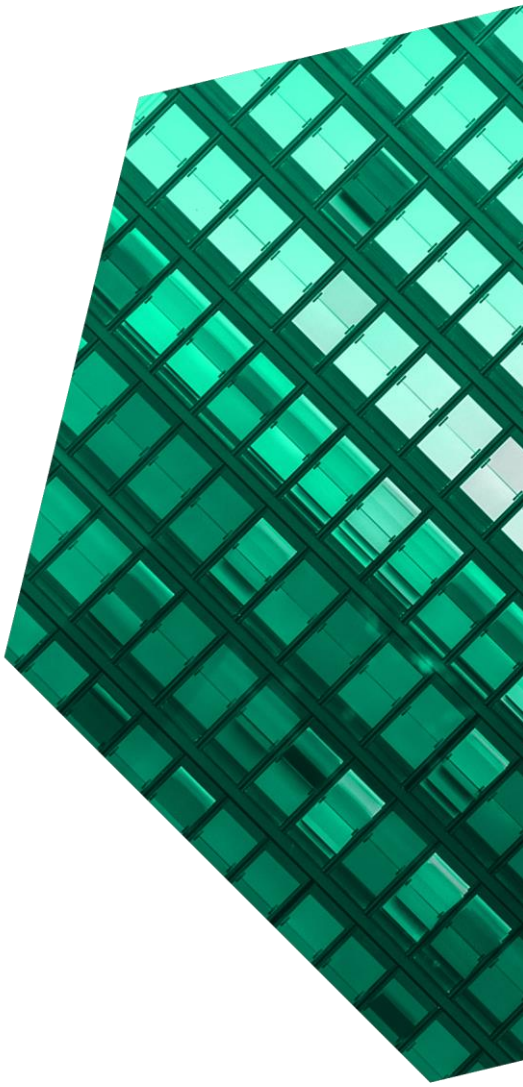


ABOUT FORRESTER CONSULTING

Forrester Consulting provides independent and objective research-based consulting to help leaders succeed in their organizations. For more information, visit forrester.com/consulting.

Executive Summary

Forrester's interviews with four Dell EMC PowerScale customers found cost savings and benefits in the following categories: storage workload optimization savings, storage management efficiencies, data center space savings, and revenue generating business value added. Interviewed customers noted that in addition to scalability and cost effectiveness over their previous systems, the performance and resiliency of their PowerScale clusters help their organizations support fast and unpredictable business growth. Customers reported the ability to run a wide variety of workloads on the same data set within a single platform.

Organizations need to manage massive amounts of unstructured data that continues to grow exponentially. Whether the data is created at the edge, core, or cloud, unstructured data helps customers innovate with data, understand business results while quickly and proactively acting on business opportunities. PowerScale scale-out storage solutions are designed for organizations that want to store unstructured data anywhere, at the edge, the data center, or the cloud.

To better understand the benefits, costs, and risks associated with migrating to a PowerScale implementation, Forrester interviewed four customers with experience using the Dell EMC PowerScale OneFS operating system. Customer interviewees noted that the PowerScale family of solutions required little training, and that managing clusters with several petabits (PBs) of data required one FTE, as compared to their previous solutions. Interviewees also noted that in addition to scalability and cost effectiveness, the performance and resiliency of their PowerScale clusters help their organizations to both support fast business growth and reduce downtime. Customers can also run a wide variety of workloads on the same data set within a single platform.

For this TEI study, Forrester has created a composite *Organization* to illustrate the quantifiable benefits and costs of investing in PowerScale solutions. See the Composite Organization section below for a more in-depth description.

Return on investment (ROI)
385%

Payback period
< 6 months

TEI methodology. Dell Technologies commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying PowerScale (formerly known as Isilon). The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of a PowerScale investment on their organizations.

Dell EMC PowerScale. According to Dell Technologies, PowerScale scale-out storage solutions are designed for organizations that want to manage their data, not their storage. PowerScale storage systems are powerful yet simple to install, manage, and scale to virtually any size. Customers can meet the most demanding business needs with a choice of PowerScale all-flash nodes along with older Isilon all-flash, hybrid, or archive nodes. Here are some observations from Dell Technologies (Forrester does not endorse Dell Technologies or its products):

- The power and capacity of Dell EMC PowerScale F900 will help organizations better innovate with their data wherever it is located.
- The F900 can deliver more performance at a lower price than some other Dell EMC Isilon all-flash systems; that is why it is the right platform for demanding workloads.
- An F900-powered cluster delivers more power and more choice to meet business needs for today and for the foreseeable future.
- Compared to the A200, the new PowerScale A300 nodes deliver more performance and include inline data reduction capabilities of deduplication and compaction.

Customer journey. For this TEI study, Forrester interviewed four PowerScale customers that consolidated their unstructured data workloads, replacing several other storage vendors.

Prior to using PowerScale, the customer interviewees used traditional storage solutions to store and analyze a rapidly growing volume of unstructured data. The interviewees often managed data in silos and had multiple storage solutions and vendors in their previous environments, creating management inefficiencies that prevented IT staff from focusing on more valuable work. These systems lacked the flexibility to scale with growth, and overprovisioning created cost inefficiencies from lower utilization. Additionally, these customer interviewees required continuous delivery of services for customer satisfaction and business growth, and these previous, less flexible systems could not provide the scalability, performance, or availability necessary to avoid costly disruptions to their business.

With PowerScale, the customer interviewees have a storage platform with a single file system, single volume, and single namespace that can easily scale PBs to accommodate rapidly growing unstructured data capacity. PowerScale's heterogeneous clusters can support a variety of applications and storage needs, with different tiers of storage appliances as well as a cloud storage tier. Aligning data with the best-fit tier creates cost efficiencies and higher utilization rates from reduced silos and reduced overprovisioning. PowerScale provides significant management efficiencies due to automated tiering with PowerScale SmartPools and CloudPools software and efficient data replication with PowerScale SyncIQ for disaster recovery.

"With traditional storage system limitations, eventually you hit a point of growth where the storage has a limit. Dell EMC's PowerScale removed that limitation for us so we could grow their single namespace out to basically unlimited capacity and performance."

— Storage architect, managed services provider

TOTAL ECONOMIC IMPACT FINDINGS

Quantified benefits. Forrester modeled $14.1 million in three-year benefits directly related to the *Organization's* investment in PowerScale storage solutions. The following are the four quantifiable benefit categories, with more details in the Analysis Of Benefits section of this study.

- **Storage workload optimization savings — $10,706,058.** The composite *Organization* replaces its previous traditional multivendor storage solution with PowerScale storage, generating significant cost savings with increased storage efficiency and cost-effective options for cold data, i.e., data that is infrequently accessed.
- **Storage management efficiencies — $1,631,157.** Management of the *Organization's* previous storage systems was complex and time-consuming. Adding capacity and managing the environment required significant effort, and management time was spent reducing downtime and resolving issues. With PowerScale, the *Organization* significantly reduced complexity and time-consuming storage management tasks.
- **Data center space savings — $253,659.** Customer interviewees found that the improved storage efficiency, density, and cloud capability of PowerScale contributed to reduced data center space requirements, as compared with their previous multivendor storage solutions, given the same storage capacity.
- **Business value added — $1,460,556.** Scalability, performance, and availability of storage infrastructure impacted the interviewed customers' ability to deliver services that satisfy customers and keep pace with business growth. Customers relied on PowerScale's performance, scalability, and availability to drive customer reach and customer satisfaction to generate incremental revenue.

"We have a very good relationship with Dell Technologies. Our account manager and SE [sales engineer] have regular meetings with us where they provide useful tips and product updates; they are very supportive. Dell Technologies has been a great partner to our organization."

— Storage infrastructure engineer, pharmaceutical sciences

Costs. Forrester modeled $2,896,895 in three-year costs associated with the *Organization's* use of PowerScale storage solutions. These are qualified by the following cost categories:

- The *Organization's* internal labor of $733,065 is associated with implementation costs and ongoing storage administration labor.
- Dell Technologies fees and costs for PowerScale are $2,163,750.

Risks. Forrester has integrated an evaluation of risks and variability into all benefit calculations for this financial analysis. The organizational scale, variety and complexity of use cases, IT complexity, and regional and broader market forces may either hamper the realization of benefits or cause price, labor, or timeline overages.

Synopsis. Forrester's risk-adjusted financial analysis for the *Organization's* investment in PowerScale storage shows $14.1 million in benefits versus $2.9 million in costs over three years, adding up to a net present value (NPV) of $11.2 million and a ROI of 385%. This a result of the *Organization* transitioning all its unstructured storage from a multivendor environment to PowerScale storage solutions.

ROI
385%

BENEFITS PV
$14.1 million

NPV
$11.2 million

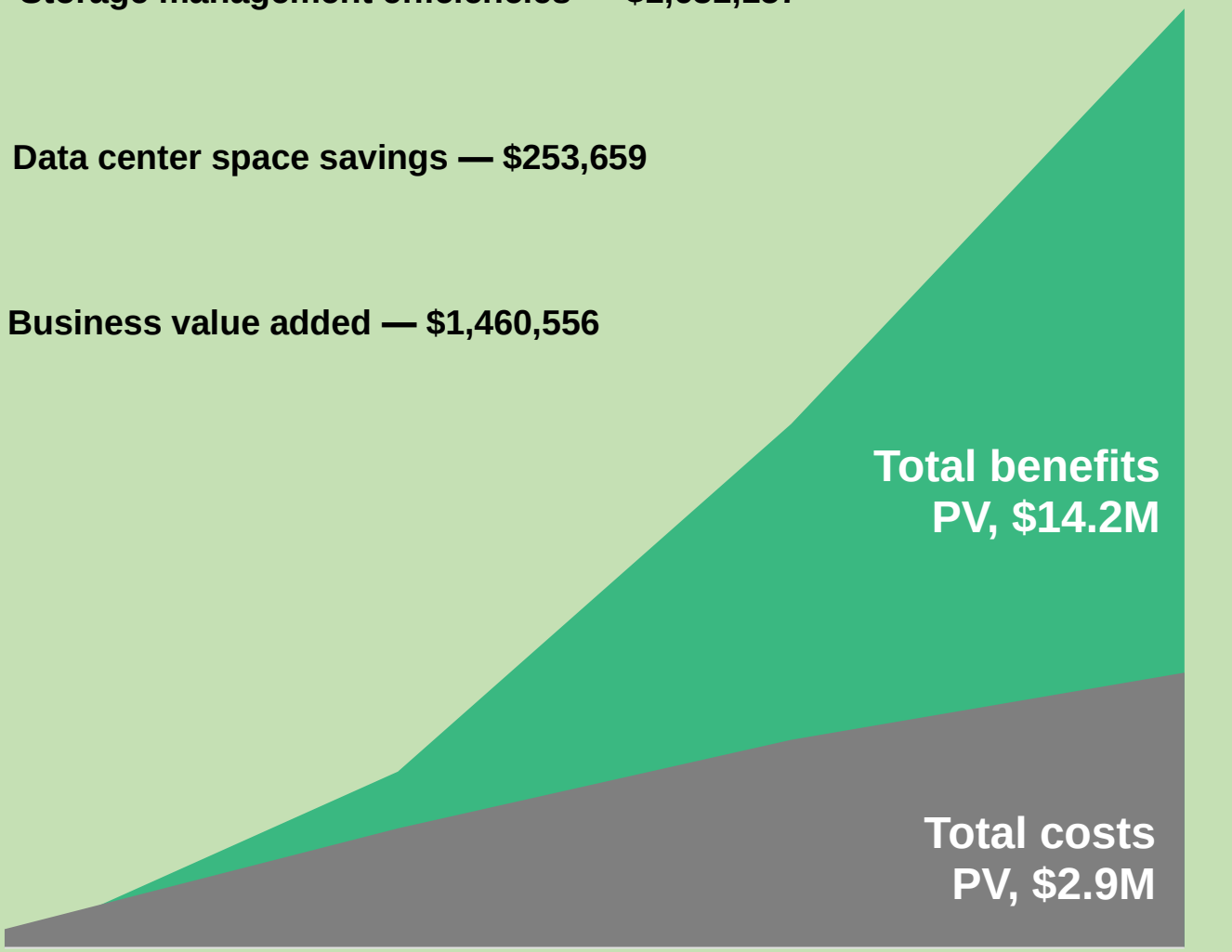
PAYBACK
<6 months

Storage workload optimization savings — $10,706,058

Storage management efficiencies — $1,631,157

Data center space savings — $253,659

Business value added — $1,460,556



TEI FRAMEWORK AND METHODOLOGY

From the information provided in the interviews, Forrester constructed a Total Economic Impact™ (TEI) framework for those organizations considering an investment in PowerScale systems.

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 PowerScale can have on an organization.

DUE DILIGENCE

Interviewed Dell Technologies stakeholders to gather data about PowerScale costs and benefits.

CUSTOMER INTERVIEW

Interviewed four customers using PowerScale to obtain data with respect to costs, benefits, and risks.

FINANCIAL MODEL FRAMEWORK

Constructed a financial model representative of the interviews using the TEI methodology and risk-adjusted the financial model based on market factors and issues and concerns of the interviewed customers.

CASE STUDY

Employed four fundamental elements of TEI in modeling the investment impact: benefits, costs, flexibility, and risks. Given the increasing sophistication of ROI analyses related to IT investments, Forrester's TEI methodology provides a complete picture of the total economic impact of purchase decisions. Please see Appendix A for additional information on the TEI methodology.

Customer Journey

Drivers leading to Dell EMC PowerScale investment

Interviewed Customers

Industry	Region	Interviewee	Time with PowerScale
Healthcare	US	Infrastructure team leader	18 months
Consumer financial services	US	Lead engineer and senior architect	18 months
Pharmaceutical	Global	Storage infrastructure engineer	12 months
Managed IT services	US	Data center manager	24 months

In addition to these recently interviewed PowerScale customers, Forrester interviewed an additional eight customers for a 2020 TEI PowerScale study. The data, information, and quotes from those customer interviews are included in this 2021 TEI study.

COMPOSITE *ORGANIZATION*

Based on the interviews, Forrester constructed a TEI framework, a composite *Organization*, and an associated ROI analysis that illustrates the areas financially affected. The composite *Organization* is representative of the four companies that Forrester interviewed and is used to present the aggregate financial analysis in the next sections. The composite *Organization* that Forrester synthesized from the customer interviews has the following characteristics:

> **"It was part of our plan to increase our business and get more customers quickly. Without a system like Dell EMC PowerScale, it would not be possible. Storage is a critical part of our business, and we have a strong vendor in Dell Technologies to back us up."**
>
> *Senior director of software-as-a-service (SaaS) engineering, software company*

Description of composite. The global *Organization* uses the PowerScale data lake to store and manage critical line-of-business applications and high-performance computing (HPC) workloads. The all-flash powered solution has to grow to drive big data analytics, AI, machine learning (ML), and deep learning (DL) workloads to deliver insights from the data. The *Organization* previously used siloed network-attached storage (NAS) solutions to store and manage this data. The *Organization* experiences rapid growth in its data capacity as well as unpredictable performance needs that are driven by ever-changing business demands. The storage must simultaneously handle multiple protocols like file, object, and Hadoop to support these workloads. Apart from the hardware power, the *Organization* needs a software eco-system to address line of business needs.

Deployment characteristics. Data capacity and performance needs are increasing every year. New workloads require massive performance as well as capacity. In order to manage this data, the *Organization* uses: PowerScale F900 all-NVMe nodes for production workloads in its primary data center; CloudPools to tier aged data to Dell EMC ECS after 12 months; PowerScale A300 nodes for disaster recovery in its secondary data center; and SyncIQ to efficiently replicate data. In the event of complete failure at the primary data center, only a key set of business critical applications will be engaged at the secondary data

center. The *Organization* also uses DataIQ and CloudIQ software for reporting and monitoring their storage and data needs. The *Organization* has an eventual average storage utilization of 85%. Based on customer interviews and analysis on their data set, the *Organization* knows that it can get up to a 4:1 data reduction on the data that is stored.

KEY CHALLENGES

The interviewees faced several challenges with their previous multivendor storage environments that led them to look for a single-vendor solution like PowerScale:

- The *Organization's* previous storage was siloed, which resulted in islands of storage and inefficient storage utilization that made it difficult to manage at the PB scale. It became difficult to add storage because of the complexity of creating logical unit numbers (LUNs), volumes, aggregates. etc. And this was further compounded by the manual time-consuming data migration that was required to balance performance and capacity. The business had to overprovision storage to address these challenges, which in turn led to wasted space and poor ROI. Because of the changing and unpredictable needs of the business, the previous solution was complex and limiting; it could not handle the future performance needs of the business.

VENDOR SELECTION

The *Organization* evaluated a range of storage vendor options with RFPs, business case analyses, and feature comparisons of leading contenders. It chose PowerScale for the world-class ecosystem as well as its perceived brand trust and reliability of Dell Technologies — as supported by interviewees' past experiences with other Dell Technologies products — and for the ability of PowerScale OneFS to:

- Scale to drive big data analytics, AI, ML, and DL workloads to deliver insights from the data.
- Simplify data storage environments and standardize to achieve cost savings and management efficiencies.
- Consolidate data into a shared data lake to improve access and enable new insights from data analytics.
- Achieve higher utilization of storage infrastructure to better meet capacity needs within budget.
- Improve scalability with the pay-as-you-grow model and reduce the number of resources needed to manage data growth.
- Blend opex (CloudPools tier) and capex (PowerScale family) models seamlessly to achieve the most cost-effective storage infrastructure.

Key assumptions

- **Primary data center cluster:**
  - **PowerScale F900 nodes**
  - **Stale data tiered to ECS after 12 months**
- **Secondary data center cluster:**
  - **PowerScale A300 nodes**
- **Software used:**
  - **SmartPools**
  - **CloudPools**
  - **SyncIQ**
  - **CloudIQ**
  - **DataIQ**

Analysis Of Benefits

Quantified benefit data as applied to the *Organization*

Total Benefits						
Ref.	**Benefit**	**Year 1**	**Year 2**	**Year 3**	**Total**	**Present Value**
Atr	Storage workload optimization savings	$2,374,048	$9,678,809	$730,476	$12,783,333	$10,706,058
Btr	Storage management efficiencies	$229,500	$573,750	$1,262,250	$2,065,500	$1,631,157
Ctr	Data center space savings	$42,000	$108,000	$168,000	$318,000	$253,659
Dtr	Business value added	$400,000	$600,000	$800,000	$1,800,000	$1,460,556
	Total benefits (risk-adjusted)	$3,045,548	$10,960,559	$2,960,726	$16,966,833	$14,051,430

STORAGE WORKLOAD OPTIMIZATION SAVINGS

Evidence and data. Interviewed customers reported data capacity and performance needs were increasing every year. New workloads required NVMe performance as well as capacity. To address these workload and performance needs, the *Organization* replaced its previous traditional storage solutions with PowerScale storage. The *Organization* is using PowerScale to store and manage critical line-of-business applications and HPC workloads. The PowerScale data lake has to be able to scale to drive big data analytics, AI, ML, and DL workloads to deliver insights from the data. The *Organization* previously used siloed NAS solutions to store and manage this data, and performance was unacceptable.

> **"For our services, we needed a storage solution that was easily scalable with a shorter delivery time than the solution we had before, and also a solution that could scale in smaller steps."**
>
> *Senior service manager, telecommunications*

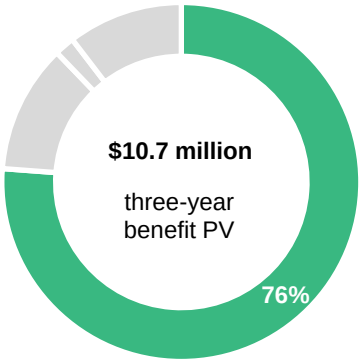
Modeling and assumptions. The composite *Organization* replaces its previous traditional multivendor storage solution with OneFS PowerScale storage, generating significant cost savings with increased storage efficiency and cost-effective options for cold data. To calculate this impact, the table below highlights the average costs the customer interviewees said would have been required to support the previous multi-vendor environment for both primary and backup architecture; and to deliver the same performance as the PowerScale storage. These average costs, which are both PV- and risk-adjusted, of $10,706,058 compare favorably to the *Organization's* costs of $2,230,019 for the PowerScale solution highlighted in the Analysis Of Costs section of this study.

Risks. Forrester uncovered several risks that may impact storage workload optimization savings which can vary with:

- Both the previous storage environment and associated costs and the ability to replace previous storage with PowerScale.

- The difference in utilization rates between PowerScale and the previous environment.
- Purchase discounts offered by Dell Technologies or other vendors.
- The interviewed customers had very different pre-PowerScale environments; therefore, the potential risk of achieving these savings varies widely.

Synopsis. To account for these risks, Forrester adjusted this benefit downward by 35%, yielding a three-year, risk-adjusted total PV of $10,706,058.



Storage workload optimization savings — 76% of total benefits

Storage Workload Optimization Savings

Ref.	Metric	Source/Calc.	Year 1	Year 2	Year 3
A1	Cost of previous multivendor storage solution — primary data center	Interviews	$2,104,762	$8,580,952	$647,619
A2	Cost of previous multivendor storage solution — backup architecture	Interviews	$1,547,619	$6,309,524	$476,190
At	Storage workload optimization savings	A1+A2	$3,652,381	$14,890,476	$1,123,809
	Risk adjustment	↓35%			
Atr	Storage workload optimization savings (risk-adjusted)		$2,374,048	$9,678,809	$730,476
	Three-year total: $12,783,333			**Three-year present value: $10,706,058**	

STORAGE MANAGEMENT EFFICIENCIES

Evidence and data. Management of the *Organization's* previous storage systems was complex and time-consuming. Adding capacity and managing the environment required significant effort, and extensive management time was spent on reducing downtime and resolving issues.

With PowerScale systems, the composite *Organization* can consolidate from multiple silos of storage to a single data lake and automate many management tasks using features like SmartPools, simplifying storage management and generating significant labor savings. Adding new PowerScale nodes to an existing cluster to scale out capacity and performance takes only a few minutes. Once the new nodes are added, the AutoBalance feature of the OneFS operating system automatically redistributes data and balances capacities across all nodes in the cluster. This simplifies management, avoids potential hot spots, and increases overall storage utilization in the cluster.

The composite *Organization* spends some time each year upgrading to the newest firmware, but interviewees noted that this is nondisruptive to end users. Interviewees also noted the high resiliency of OneFS; for some, it eliminates downtime completely. Other management tasks done more easily with OneFS include setting policies and monitoring capacity to ensure enough room for growth, as well as simplifying reporting and monitoring with DataIQ and CloudIQ. Unlike the *Organization's* previous

storage environment, the OneFS storage management complexity does not increase with added capacity.

Modeling and assumptions. With PowerScale, one FTE can manage several PBs of data with another FTE added in Year 2 as storage capacity grows. The result is freeing up staff to work on more value-add activities.

For the composite *Organization*, Forrester assumes that:

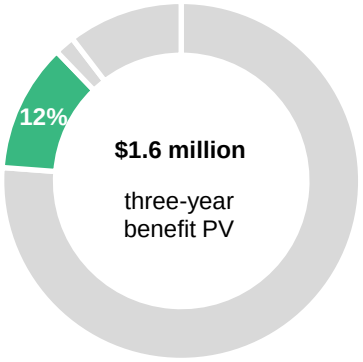
- In the previous environment, each administrator managed 500 TBs of data, on average.
- With PowerScale, each administrator can manage 5 PBs of data, on average.

Risks. Storage management efficiencies and resulting benefits can vary with:

- The administrator-to-capacity ratio in the previous storage environment.
- Regional differences in fully loaded labor costs for storage administrators.
- The ability for the *Organization* to standardize on PowerScale for unstructured data storage.

Synopsis. To account for these risks, Forrester adjusted this benefit downward by 25%, yielding a three-year, risk-adjusted PV of $1,631,157.

- Admin-to-capacity ratio for prior state: 500 TB/admin
- With PowerScale: 5 PB/admin



Storage management efficiencies — 12% of total benefits

Storage Management Efficiencies

Ref.	Metric	Source/Calc.	Year 1	Year 2	Year 3
B1	Storage management labor needed, previous storage environment	Interviews — FTEs	3	7	13
B2	Storage management labor needed — PowerScale family	Interviews — FTEs	1	2	2
B3	Average fully-loaded compensation — storage administrator	Industry average	$153,000	$153,000	$153,000
Bt	Storage management efficiencies	(B1-B2)*B3	$306,000	$765,000	$1,683,000
	Risk adjustment	↓25%			
Btr	Storage management efficiencies (risk-adjusted)		$229,500	$573,750	$1,262,250
	Three-year total: $2,065,500			**Three-year present value: $1,631,157**	

DATA CENTER SPACE SAVINGS

Evidence and data. Customer interviewees found that the improved storage efficiency, density, and cloud capability of PowerScale contributed to reduced data center space requirements, as compared with their previous storage solutions, given the same storage capacity. Higher utilization of PowerScale, as compared with traditional storage utilization, means organizations need less physical capacity in the data center to support the same storage needs. By tiering cold data to the cloud, the composite *Organization* can further reduce on-premises physical capacity needed in the data center.

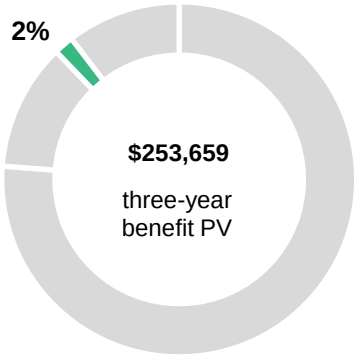
Modeling and assumptions. Factors contributing to data center space savings include:

- PowerScale capacity takes significantly less space compared with the previous storage solutions.
- One benefit of using CloudPools is the avoidance of additional F900 node purchases, further reducing data center space needs. With CloudPools, the *Organization* requires significantly less space compared with the previous storage solution for the same capacity.
- When including both the primary and disaster recovery data centers, by Year 3 the *Organization* saves 28 racks of space by using PowerScale with SmartPools and CloudPools.
- Data center savings per rack are driven primarily by a reduction in average power and cooling costs of $7,500 per rack.

Risks. Data center space savings can vary with:

- Differences in the previous storage environment, including previous space requirements and utilization rates.
- Whether the storage environment uses a cloud tier or has redundant data center sites.
- Regional differences in utility power costs per kilowatt hour.

Synopsis. To account for these risks, Forrester adjusted this benefit downward by 20%, yielding a three-year, risk-adjusted PV of $253,659.



Data center space savings — 2% of total benefits

> "Dell EMC PowerScale was one of the best technology investment decisions we've ever made."
>
> *Data center manager*

Data Center Space Savings

Ref.	Metric	Source/Calc.	Year 1	Year 2	Year 3
C1	Racks needed for previous storage environment	Interviews	9	20	30
C2	Racks needed for PowerScale family (one primary, one backup)	Dell Technologies	2	2	2
C3	Data center cost savings per rack	Industry average	$7,500	$7,500	$7,500
Ct	Data center space savings	(C1-C2) *C3	$52,500	$135,000	$210,000
	Risk adjustment	↓20%			
Ctr	Data center space savings (risk-adjusted)		$42,000	$108,000	$168,000
	Three-year total: $318,000			**Three-year present value: $253,659**	

BUSINESS VALUE ADDED

Evidence and data. PowerScale's scalability, performance, availability and software eco-system positively impacted the interviewed customers' ability to deliver services that satisfy customers and keep pace with business growth. Some interviewees were able to quantify some of that impact, which ranges from several hundred thousand dollars of benefit per year to several million dollars in incremental revenue. Some of these impacts include the following, as described by the interviewees:

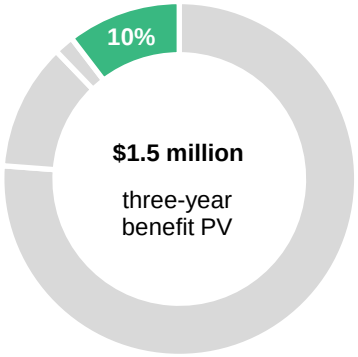
- "It was part of our plan to grow our business and get more customers quickly. Without a system like PowerScale, it wouldn't be possible. Storage is a critical part of our system, and we have a strong vendor in Dell Technologies to back us up."
- "From the moment we started with PowerScale, we grew our customer base in a more continuous and stable way than with our previous storage environment. High availability is very important and upgrading the firmware or software for PowerScale can be done without any user impact. This was a very important requirement for selecting PowerScale."

Modeling and assumptions. Some interviewees rely on high performance and availability for the success of revenue-generating projects. Customers relied on PowerScale's performance, scalability, and availability to drive customer reach and customer satisfaction to generate incremental revenue.

Forrester conservatively assumes that the composite *Organization* generates $500,000 in incremental business value in Year 1, increasing to $1 million in business value by Year 3.

Risks. Interviewees provided a broad range of quantified impacts that depend on the previous environment, industry, and organization-specific opportunities.

Synopsis. To account for these variations, Forrester adjusted this benefit downward by 20%, yielding a three-year, risk-adjusted PV of $1,460,556.



Business value added — 10% of total benefits

Business Value Added

Ref.	Metric	Source/Calc.	Year 1	Year 2	Year 3
D1	Business value added	Interviews	$500,000	$750,000	$1,000,000
Dt	Business value added	D1	$500,000	$750,000	$1,000,000
	Risk adjustment	↓20%			
Dtr	Business value added (risk-adjusted)		$400,000	$600,000	$800,000
	Three-year total: $1,800,000			**Three-year present value: $1,460,556**	

VOICE OF THE CUSTOMER ON POWERSCALE EFFICIENCY

"If we had stayed with and grew our multivendor storage environment, we would have needed five FTEs: two storage engineers and three operations staff to perform tasks. With Dell EMC PowerScale, we are able to manage the whole environment with about three-quarters of an FTE."

— Storage infrastructure engineer, pharmaceutical sciences

VOICE OF THE CUSTOMER ON POWERSCALE DEPENDABILITY

"Being able to add capacity and performance quickly has been great. We have had several occasions when we needed to expand capacity and performance quickly, and Dell EMC PowerScale allowed us to meet our customers' needs. We can depend on PowerScale to come through for us."

— Data center manager, managed IT services

FLEXIBILITY

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

There are scenarios in which a customer might choose to implement PowerScale storage and later realize additional uses and business opportunities:

- A key benefit of the PowerScale data lake, which supports a broad ecosystem and a wide range of applications, is the ability to share data more effectively across those applications and to potentially surface new insights with in-place analytics. One interviewed customer noted: "A key thing for us is we're advertising PowerScale as our data lake foundation. As we're pushing more big data initiatives and big data services, it's becoming more valuable to us to have multiprotocol access to the same set of data. Based on initial tests, we are able to use PowerScale to eliminate additional infrastructure that would have been required with a traditional Hadoop platform." Potential benefits for future analytics efforts include avoided infrastructure costs, more efficient data analytics projects, and positive business impacts from data insights.
- Interviewees reported additional cost efficiencies with PowerScale's inline data reduction and SmartDedupe data deduplication software. Based on the amount of redundant data organizations are storing, SmartDedupe can help them achieve additional storage efficiency by reducing the amount of physical storage needed, helping to avoid unnecessary node purchases and maximizing the use of data center space.

Flexibility would also be quantified when evaluated as part of a specific project.

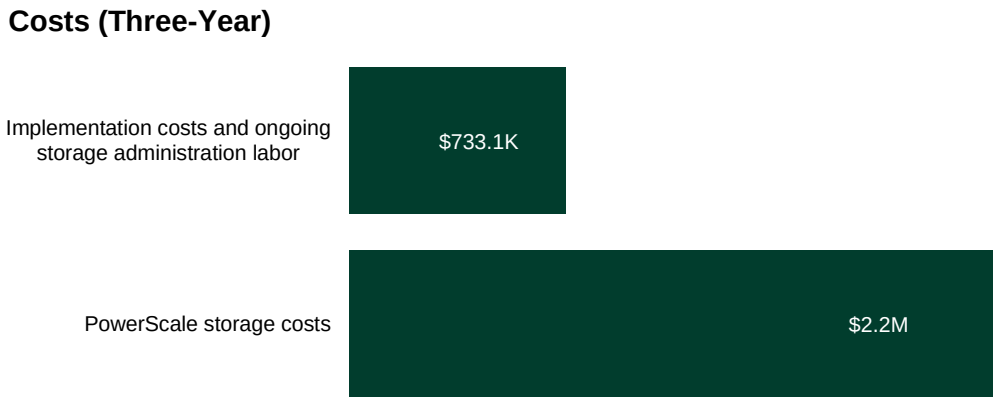
"A key thing for us is we're advertising Dell EMC PowerScale as our data lake foundation. As we are pushing more big data workloads and big data services, it is becoming more valuable to us to have multiprotocol access to the same set of data. Based on initial tests, we are able to use PowerScale storage to eliminate additional infrastructure that would have been required with a traditional Hadoop platform."

Director of IT infrastructure

Analysis Of Costs

Quantified cost data as applied to the composite *Organization*

Total Costs							
Ref.	**Cost**	**Initial**	**Year 1**	**Year 2**	**Year 3**	**Total**	**Present Value**
Etr	Implementation costs and ongoing storage administration labor	$73,200	$156,000	$343,200	$312,000	$884,400	$733,065
Ftr	PowerScale storage costs	$1,036,702	$110,508	$1,044,911	$216,983	$2,409,105	$2,163,750
	Total costs (risk-adjusted)	$1,109,902	$266,508	$1,388,111	$528,983	$3,293,505	$2,896,815



IMPLEMENTATION COSTS AND ONGOING STORAGE ADMINISTRATION LABOR

Evidence and data. Interviewees spent minimal time on PowerScale implementation and ongoing management. They also required minimal training as part of the PowerScale implementation due to the ease in administering the storage solution.

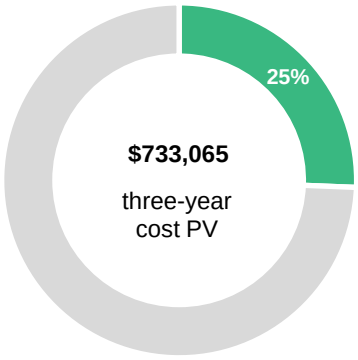
Modeling and assumptions. For the composite *Organization*, Forrester assumes that:

- For the initial implementation, the composite *Organization* had several employees spending portions of their time over the course of a few weeks designing the PowerScale deployment. These employees worked with the network team to ensure the network infrastructure could support PowerScale appliances and to migrate the data to the first PowerScale nodes. The *Organization* spent 160 total hours on implementation.
- Dell Technologies (or partner) provided initial implementation help at a cost of $50,000 for the F900s and $16,000 in Year 2 for the deployment of the A300s.
- A few of the *Organization's* employees participated in a half-day training session that totaled 16 hours.
- As mentioned in the Storage Management Efficiencies benefit explanation above, on an ongoing basis, one FTE is needed in Year 1 (2,080 hours) and two FTEs (4,160 hours) are needed in Years 2 and 3 for general storage management tasks.

Risks. Forrester uncovered low risks that may impact implementation and ongoing storage administration costs which will vary with:

- Different storage administrator skill levels.
- Regional differences in fully loaded costs for storage administrators.
- Different previous storage environments.
- Complexity of data migration efforts.

Synopsis. To account for these risks, Forrester adjusted this cost upward by 20%, yielding a three-year, risk-adjusted PV of $733,065.



Implementation costs and ongoing storage administration labor — 25% of total costs

Implementation Costs And Ongoing Storage Administration Labor						
Ref.	**Metric**	**Source/Calc.**	**Initial**	**Year 1**	**Year 2**	**Year 3**
E1	Dell Technologies or partner implementation fees	Dell Technologies	$50,000	0	$16,000	0
E2	Initial implementation and data migration hours	Interviews — hours	160	0	160	0
E3	Initial PowerScale training time	Interviews — hours	16	0	0	0
E4	Ongoing storage administration	Interviews — FTE hours	0	2,080	4,160	4,160
E5	Average fully loaded hourly compensation — storage administrator	$130,000/2080	$62.50	$62.50	$62.50	$62.50
E6	Internal storage implementation and ongoing labor costs	(E2+E3+E4)*E5	$11,000	$130,000	$270,000	$260,000
Et	Implementation costs and ongoing storage administration labor	E1+E6	$61,000	$130,000	$286,000	$260,000
	Risk adjustment	↑20%				
Etr	Implementation costs and ongoing storage administration labor (risk-adjusted)		$73,200	$156,000	$343,200	$312,000
	Three-year total: $884,400			**Three-year present value: $733,065**		

POWERSCALE STORAGE COSTS

Evidence and data. The composite *Organization* has two PowerScale clusters, one in the primary data center and one in the disaster recovery data center. The *Organization* uses: PowerScale F900 all-NVMe nodes for production workloads in its primary data center; CloudPools to tier aged data to Dell EMC ECS after 12 months; PowerScale A300 nodes for disaster recovery in its secondary data center; and SyncIQ to efficiently replicate data.

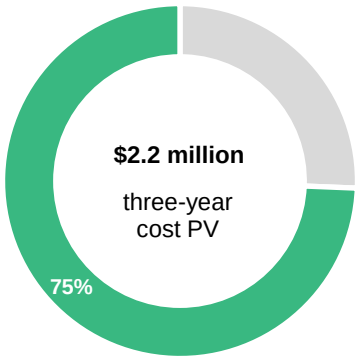
Modeling and assumptions. Forrester's model assumes the following configurations:

- In the initial period the *Organization* deploys PowerScale F900 appliances in the primary data center cluster for production workflows, and it begins using the F900s in Year 1. In Year 2, it tiers data that is older than twelve months to its ECS cloud.
- By the end of Year 2, the *Organization* has F900 appliances, ECS hardware and software, and A300 appliances to store the replicated data.
- In Years 1 to 3, the *Organization* pays hardware and software maintenance for the F900 appliances purchased in Year 1. And in Years 2 and 3, it pays hardware and software maintenance for the A300 appliances and the ECS hardware.
- For the *Organization*, file (network file system (NFS) and server message block (SMB), object (S3), and Hadoop protocols are required to run key line of business applications.
- The *Organization* uses SyncIQ to replicate its data to the PowerScale A300 cluster in the disaster recovery data center.
- In order to automate these tiering and data replication policies, the *Organization* uses SmartPools, CloudPools, and SyncIQ. The *Organization* also uses DataIQ and CloudIQ for monitoring and reporting.

Risks. PowerScale costs can vary with licensing agreements, discounts, differing configurations of

appliances, tiering policies, and selections of PowerScale tiers and storage growth rates. Therefore, Forrester risk-adjusted PowerScale fees upward by 5%.

Synopsis. This cost category yielded a three-year, risk-adjusted PV of $2,163,750



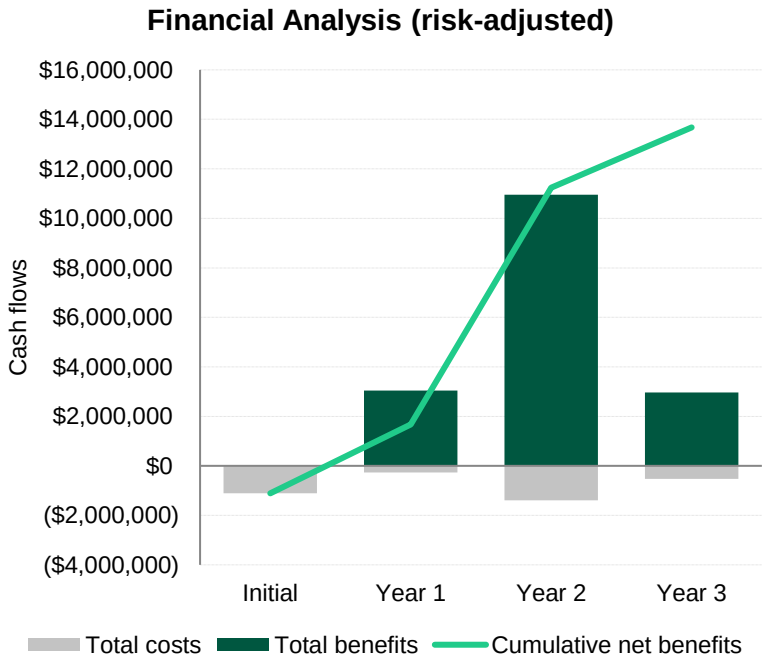
PowerScale storage costs — 75% of total costs

PowerScale OneFS Powered Storage Costs

Ref.	Metric	Source/Calc.	Initial	Year 1	Year 2	Year 3
F1	PowerScale costs: F900 nodes, A300 nodes, ECS hardware and associated switches, cables, chassis, and optics Software included: OneFS, SmartPools, CloudPools and DataIQ, and hardware and software annual maintenance	Dell Technologies	$987,335	$105,246	$995,154	$206,651
	Risk adjustment	↑5%				
Ftr	PowerScale costs (risk-adjusted)		$1,036,702	$110,508	$1,044,911	$216,983
	Three-year total: $2,409,105			**Three-year present value: $2,163,750**		

Financial Summary

CONSOLIDATED THREE-YEAR RISK-ADJUSTED METRICS



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 for the interviewed organization. Forrester assumes a yearly discount rate of 10% for this analysis.

Cash Flow Analysis (Risk-Adjusted Estimates)

	Initial	Year 1	Year 2	Year 3	Total	Present Value
Total costs	($1,109,902)	($266,508)	($1,388,111)	($528,983)	($3,293,505)	**($2,896,815)**
Total benefits	$0	$3,045,548	$10,960,559	$2,960,726	$16,966,833	**$14,051,430**
Net benefits	($1,109,902)	$2,779,039	$9,572,448	$2,431,743	$13,673,328	**$11,154,615**
ROI						**385%**
Payback period						**<6 months**

Intel Partnership

Intel has partnered with Dell Technologies to optimize Intel® Xeon® Scalable CPUs, Intel® Optane™ SSDs, and Intel® 3D NAND SSDs for storage infrastructure and data services, delivering predictable performance and a seamless storage experience. Intel drives the industry forward in developing new technology standards and contributing to open standard projects.

Intel® 3D NAND SSDs work with Intel Xeon processors to meet today's increasingly demanding service levels and support broader cloud workloads, while reducing storage costs. Packed with a deep feature set, these cloud-20 inspired SSDs are optimized for cloud infrastructures, offering outstanding quality, reliability, advanced manageability, and serviceability to minimize service disruptions.

Architected with 64-layer, Intel® 3D NAND Technology, the Intel® SSD DC P4510 Series delivers performance, Quality of Service (QoS), and capacity to help optimize storage efficiency, enabling data centers to do more per server, minimize service disruptions, and efficiently manage at scale.

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."

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.