The Total Economic Impact™ Of The Dell EMC All-Flash Storage Portfolio

Improved Performance And Cost Efficiency Enabled By The Dell EMC All-Flash Storage Portfolio
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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

Dell EMC All-Flash storage portfolio provides a range of end-to-end storage solutions allowing customers to reduce cost, improve speed, and increase agility. As companies look to transform their IT organizations, they keep a critical eye to key performance indicators of a modern infrastructure including reduced costs, improvement in performance, and increased agility. Dell EMC All-Flash storage solutions help companies meet these objectives and offer a variety of best-in-class features that provide organizations the ability to quickly scale capacity with data compression, deduplication, and thin provisioning and help improve performance without sacrificing performance. Dell EMC commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying Dell EMC All-Flash storage. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of Dell EMC All-Flash storage solutions on their organizations. To better understand the investment benefits, costs, and risks, Forrester interviewed four current customers who have deployed Dell EMC All-Flash storage solutions in their organizations.

Prior to using Dell EMC All-Flash storage, the interviewed customers used traditional disk storage exclusively, which posed many challenges to deal with the growth of data in the new digital economy. The growth provided scalability challenges, performance issues, and increased burden on internal IT teams to quickly add and manage capacity. Storage administrators had to also deal with the acceleration of virtualization of their IT infrastructure environment and address the security, performance, and management challenges that resulted. In addition, the proliferation of the amount of unstructured data required organizations to quickly add storage capacity that often meant buying additional hardware and led to higher capital expenditures, license costs, and the need to hire additional resources to help deploy and manage the increased storage footprint. Organizations realized that they needed a cost-efficient storage solution that could scale with the enterprise to help align with their business objectives.

By implementing Dell EMC All-Flash storage solutions, the interviewed organizations could transition to a more modern IT infrastructure and have the flexibility to customize their storage requirements based on Dell EMC’s best-of-breed All-Flash storage options. Organizations required a smaller number of servers and devices to meet their performance and availability requirements and needs, and storage administrators could manage significantly more of data. They also realized improvements in latencies, which allowed organizations to run capabilities like compression and deduplication without impacting performance. A director of server storage architecture of an oil and gas company noted, “We started having an array of unplanned outages, including two major outages to our ERP and financial systems, which we could not afford as a business. With Dell EMC All-Flash storage, we have had no major outages, and we have much more flexibility to manage our data storage needs.”
Key Findings

**Quantified benefits.** The interviewed organization experienced the following risk-adjusted quantified benefits:

- **Increased IT productivity by improved application performance, resulting in over $600,000 of benefits.** The interviewed organizations experienced a 90% reduction in help desk tickets regarding issues with application performance and downtime. Prior to deploying Dell EMC All-Flash storage, IT teams at interviewed organizations were managing and resolving up to 30 help desk tickets a month due to application outages or performance issues. This put a lot of stress on the IT teams and required 12 hours of manpower on average to resolve each issue. With Dell EMC All-Flash storage, interviewed organizations have not experienced any large-scale outages, and application performance-related issues have significantly reduced. In addition, traditional disk storage appliance required many IT manhours to implement, deploy, and then manage on an ongoing basis. Storage administrators could now replace servers without long, drawn-out data migrations, and they could take advantage of increased automation related to data provisioning, application tiering, and workload management. This has resulted in nearly 325 IT manhours per month of productivity gains for the interviewed organizations.

- **Increased end user productivity by improved application performance, resulting in $2.7 million of benefits.** One-third of the interviewed organizations’ employees rely on mission-critical applications daily to conduct their business activity. These applications are linked to an employee’s productivity and achieving business success. An outage or performance issue with these application workloads has a direct impact into the organization’s top line and the organization’s ability to service its customers. Prior to moving key applications and workloads onto Dell EMC All-Flash storage solutions, the interviewed organizations frequently had issues with their business-critical applications that affected the business’ performances of their regular duties. After implementing the Dell All-Flash storage solutions, interviewed organizations are now realizing 99.999% availability of these mission-critical applications, which directly improves end user productivity.
Storage hardware and ongoing management savings, resulting in $770,000 of benefits. Interviewed organizations noted that, with Dell EMC All-Flash storage, they can store a significantly greater amount of data than with their previous traditional disk storage environments. In addition, organizations’ needs to move to an increased virtualization required lower latency of All-Flash as well as a significant improvement in server capacity utilization. Organizations could now support these increased virtualized workloads and realize higher application performance with reduced server needs. The freed-up server capacity and the avoidance to purchase additional storage hardware and servers result in significant capex savings. In addition, reduced server requirements resulted in reduced software license and annual maintenance costs, which led to annual opex savings.

Power and cooling savings, resulting in $152,000 of benefits. Dell EMC All-Flash storage allowed interviewed organizations to reduce their power and cooling costs by 85% because of reduced server and rack space requirements.

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

- Faster application deployment. Due to greater input/output per second (IOPS) and lower latency, interviewed organizations improved deployment speeds from months to days when they moved to Dell All-Flash storage.

- Improved ability to scale. All-Flash storage enabled the organization to easily increase and decrease storage capacity with minimal advanced planning.

- Reduced need of specialized IT resources. The solutions could be managed by general IT resources and did not require specialized skill sets as needed in their previous solutions.

“Dell EMC All-Flash storage solution is versatile like a Swiss army knife. They have a full suite of best-of-breed products that provide organizations the flexibility to meet their data storage requirements. They allow organizations to customize and choose across best-of-breed solutions to meet their needs.”

Infrastructure architect, large education system
Costs. The interviewed organizations experienced the following risk-adjusted costs:

- **Dell EMC All-Flash storage costs of $1.7 million.** Interviewed organizations transitioned about 1 petabyte of data onto Dell EMC’s All-Flash storage portfolio. The organizations invested in three separate Dell EMC solutions (Dell EMC Unity, Dell EMC VMAX, and Dell EMC XtremIO) to meet their storage needs. This resulted in both an initial investment to transition to an all-flash array but also a yearly maintenance cost.

- **Costs of internal labor resources during assessment, implementation, and ongoing management of $192,000.** Internal FTEs are required to deploy, manage, and administer Dell EMC All-Flash Storage that will cost an organization about $192,000 over three years.

Forrester’s interview with four existing customers and subsequent financial analysis, using a discount rate of 10%, found that a composite organization based on the interviewed organizations will experience present value (PV) benefits of $4,192,179 over three years versus PV costs of $1,850,981, adding up to a net present value (NPV) of $2,341,198 and an ROI of 126%.
Financial Summary

CONSOLIDATED FOUR-YEAR RISK-ADJUSTED METRICS

Cash Flow Chart (Risk-Adjusted)

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

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

Cash Flow Table (Risk-Adjusted)

<table>
<thead>
<tr>
<th></th>
<th>INITIAL</th>
<th>YEAR 1</th>
<th>YEAR 2</th>
<th>YEAR 3</th>
<th>TOTAL</th>
<th>PRESENT VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total costs</td>
<td>($1,363,098)</td>
<td>($196,185)</td>
<td>($196,185)</td>
<td>($196,185)</td>
<td>($1,951,653)</td>
<td>($1,850,981)</td>
</tr>
<tr>
<td>Total benefits</td>
<td>$0</td>
<td>$1,685,737</td>
<td>$1,685,737</td>
<td>$1,685,737</td>
<td>$5,057,211</td>
<td>$4,192,179</td>
</tr>
<tr>
<td>Net benefits</td>
<td>($1,363,098)</td>
<td>$1,489,552</td>
<td>$1,489,552</td>
<td>$1,489,552</td>
<td>$3,105,558</td>
<td>$2,341,198</td>
</tr>
<tr>
<td>ROI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>126%</td>
</tr>
<tr>
<td>Payback period</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11 months</td>
</tr>
</tbody>
</table>
The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

**TEI Framework And Methodology**

From the information provided in the interview, Forrester has constructed a Total Economic Impact™ (TEI) framework for those organizations considering implementing the Dell EMC All-Flash storage solutions. 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 the Dell EMC All-Flash storage solutions can have on an organization:

- **DUE DILIGENCE**
  Interviewed Dell EMC stakeholders and Forrester analysts to gather data relative to All-Flash storage.

- **CUSTOMER INTERVIEW**
  Interviewed four organizations using Dell EMC All-Flash storage to obtain data with respect to costs, benefits, and risks.

- **COMPOSITE ORGANIZATION**
  Designed a composite organization based on characteristics of the interviewed organizations.

- **FINANCIAL MODEL FRAMEWORK**
  Constructed a financial model representative of the interview using the TEI methodology and risk-adjusted the financial model based on issues and concerns of the interviewed organization.

- **CASE STUDY**
  Employed four fundamental elements of TEI in modeling the Dell EMC All-Flash storage solutions’ impact: benefits, costs, flexibility, and risks. Given the increasing sophistication that enterprises have regarding ROI analyses related to IT investments, Forrester’s TEI methodology serves to provide a complete picture of the total economic impact of purchase decisions. Please see Appendix A for additional information on the TEI methodology.

**DISCLOSURES**

Readers should be aware of the following:

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

Forrester makes no assumptions as to the potential ROI that other organizations will receive. Forrester strongly advises that readers use their own estimates within the framework provided in the report to determine the appropriateness of an investment in the Dell EMC All-Flash storage solution.

Dell EMC reviewed and provided feedback to Forrester, but Forrester maintains editorial control over the study and its findings and does not accept changes to the study that contradict Forrester’s findings or obscure the meaning of the study.

Dell EMC provided the customer names for the interviews but did not participate in the interviews.
The Dell EMC All-Flash Storage Portfolio
Customer Journey

BEFORE AND AFTER THE ALL-FLASH STORAGE INVESTMENT

Interviewed Organizations

Organizations of all types benefit from the Dell EMC All-Flash storage solutions, including healthcare, education, oil and gas, and consulting companies looking to improve application performance and runtime, agility, and scale quickly to meet their customer demands.

For this study, Forrester conducted four interviews with Dell EMC customers who had deployed a combination of All-Flash arrays into their environments. Interviewed customers include the following:

<table>
<thead>
<tr>
<th>INDUSTRY</th>
<th>HEADQUARTERS</th>
<th>EMPLOYEES</th>
<th>TOTAL STORAGE CAPACITY UNDER MANAGEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil and gas</td>
<td>United States</td>
<td>7,500</td>
<td>4.5 petabytes total capacity; 2.5 petabytes on Dell EMC All-Flash</td>
</tr>
<tr>
<td>Healthcare system</td>
<td>United States</td>
<td>23,000</td>
<td>2 petabytes total capacity, 100 TBs on Dell EMC All-Flash</td>
</tr>
<tr>
<td>IT consulting</td>
<td>Canada</td>
<td>100</td>
<td>Partner and customer for Dell ECM All-Flash</td>
</tr>
<tr>
<td>Education system</td>
<td>United States</td>
<td>5,000 faculty and staff 25,000 students</td>
<td>3 petabytes total capacity, 1.5 petabytes on Dell EMC All-Flash</td>
</tr>
</tbody>
</table>

Composite Organization

Based on customer interviews with four existing Dell EMC customers, Forrester constructed a composite organization that highlights the financial benefits, costs, and associated ROI experienced from implementing the Dell EMC All-Flash storage solutions. The organization is representative of the customers Forrester interviewed and is used to present the aggregate financial analysis in the next section. The organization that Forrester synthesized from interviews has the following characteristics:

- A US-based organization with 10,000 employees.
- Three petabytes of total storage under management.
- One petabyte of storage transitioned on Dell EMC All-Flash storage products based to match their consumption needs.
- Four storage administrators.
- Three thousand total applications.

The organization has transitioned applications, databases, and workloads onto three Dell EMC All-Flash products:

Key assumptions

- 10,000 employees
- 3 petabytes of total storage
- 1 petabyte of storage transition to All-Flash arrays
300 TB of data onto Dell EMC Unity All-Flash. The organization transitioned many of its mid-tier portfolios and arrays including security and reporting applications onto Dell EMC Unity All-Flash to simplify operations and reduce costs.

600 TB of data onto Dell EMC VMAX All Flash. The organization transitioned mission-critical applications including ERP, SQL Server environment, Oracle database HR, Payroll, and Purchasing onto Dell EMC VMAX All-Flash.

100 TB of data onto Dell EMC XtremIO. The organization transitioned key tier one applications onto Dell EMC XtremIO to improve performance, reduce latency, and realize increased storage efficiencies with deduplication, compression, and thin provisioning features.

Key Challenges And Objectives

The performance requirements of the organization’s virtualization platforms, cloud computing, and enterprise applications are rapidly increasing, which has led data center and storage administrators to modernize their storage environments from spinning hard drives to flash-based storage.

After a review process of evaluating several vendors, the organization selected the Dell EMC All-Flash storage portfolio, as it believes Dell EMC can satisfy its following business challenges, goals, and objectives:

› Improve application performance and runtime.
› Ensure 99.999% availability of all its mission-critical applications.
› Best-of-breed solution offering to meet their unique consumption model (end-to-end offering).
› Gain real-time access to data to support faster and better business decision making.
› Improve storage capacity to scale with business demands and align with the organization’s IT modernization and virtualization strategy.
› Realize capex savings with lower server requirements.
› Realize Opex savings through labor, power and cooling, and productivity.

"Without a doubt, moving to Dell EMC All-Flash has been great investment for us as we have been able to consolidate our multiple and fragmented IT organizations into a more nimble, flexible organization that can react to our customers faster and more efficiently provide solutions to meet their needs."

Direct enterprise architecture, healthcare company

"Dell EMC Unity is the perfect All-Flash storage solution for us to meet both our cost and performance goals. The architecture is simple so we could manage the implementation in-house without any outside support."

Partner, IT consulting company
Key Results

The organization revealed that key results from the All-Flash storage investment include:

**Improved application performance and optimized cost structure.** The organization could reduce the unacceptably high latency among some of its key applications and take advantage of the differing performance levels to optimize its cost structure. The organization realized 90% reduction in help-desk tickets relating to application outages, performance, and latency issues.

**Capex cost avoidance.** The organization was continually adding virtual servers and increasing storage capacity to offset ongoing performance challenges and inefficiencies. The organization was looking for a solution to help reduce the total cost of investing in additional storage solutions without sacrificing performance. The organization estimated $300,000 of Capex avoidance related to storage hardware and $45,000 in annual storage server licensing costs.

**Opex cost avoidance.** The organization could streamline operations and reduce labor costs associated with data migration, reporting, and addressing performance issues. Transitioning to Dell EMC All-Flash allowed storage administrators to manage up to 10 times more data and allow the organization to scale more effectively.

**Flexible solution.** The organization had a wide variety of applications and was introducing new digital architectures into its storage environment including big data and OpenStack architectures. Dell EMC provided a choice of best-of-breed products based on consumption and performance objectives that provided the organization with flexibility in pricing and design.

**Reduced complexity.** Storage administration needed to be simpler than managing the traditional spinning disk environment for both implementation and ongoing management.

**Improved capacity utilization.** The organization could dramatically reduce its storage needs by transitioning a large portfolio onto Dell EMC All-Flash.

"With Dell EMC VMAX, we now have a customizable storage platform that can quickly adapt and scale to our production workloads. We can now easily place internal storage policies and controls to achieve optimal performance without experiencing any downtime or latency issues."

*Storage server architecture, oil and gas*

"My IT team was continually burdened with spending lots of their time being reactive and addressing application performance issues. We have practically eliminated help desk incidents making not only the business more productive but allowing my resources to focus on more transformative issues."

*Partner, IT consulting company*
Financial Analysis

QUANTIFIED BENEFIT AND COST DATA

Total Benefits

<table>
<thead>
<tr>
<th>REF.</th>
<th>BENEFIT</th>
<th>INITIAL</th>
<th>YEAR 1</th>
<th>YEAR 2</th>
<th>YEAR 3</th>
<th>TOTAL</th>
<th>PRESENT VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atr</td>
<td>Increased IT resource productivity</td>
<td>$0</td>
<td>$244,944</td>
<td>$244,944</td>
<td>$244,944</td>
<td>$734,832</td>
<td>$609,139</td>
</tr>
<tr>
<td>Btr</td>
<td>Increased business productivity</td>
<td>$0</td>
<td>$1,069,093</td>
<td>$1,069,093</td>
<td>$1,069,093</td>
<td>$3,207,279</td>
<td>$2,658,676</td>
</tr>
<tr>
<td>Ctr</td>
<td>Storage hardware and ongoing maintenance savings</td>
<td>$0</td>
<td>$310,500</td>
<td>$310,500</td>
<td>$310,500</td>
<td>$931,500</td>
<td>$772,168</td>
</tr>
<tr>
<td>Dtr</td>
<td>Power and cooling savings</td>
<td>$0</td>
<td>$61,200</td>
<td>$61,200</td>
<td>$61,200</td>
<td>$183,600</td>
<td>$152,195</td>
</tr>
<tr>
<td></td>
<td>Total benefits (risk-adjusted)</td>
<td>$0</td>
<td>$1,685,737</td>
<td>$1,685,737</td>
<td>$1,685,737</td>
<td>$5,057,211</td>
<td>$4,192,179</td>
</tr>
</tbody>
</table>

The benefits listed above are all cost avoidance savings. These benefits are the costs that the organization would have incurred for traditional storage infrastructure in all four of the benefit categories. For an in-depth discussion of the Forrester Total Economic Impact methodology, please refer to Appendix A.

Increased IT Resource Productivity

The composite organization was dedicating an increasing number of IT and storage administrative manhours to resolve application performance issues that came up frequently in its traditional legacy storage environments. Additionally, IT resources were increasingly involved in deploying and implementing new storage hardware assets as capacity. Prior to transitioning to All-Flash arrays, the business would frequently face performance issues due to outages, high latency, and application downtime. Each incident would require multiple IT teams to get involved to resolve. With the investment in transitioning to Dell EMC’s All-Flash portfolio, the composite organization has dramatically reduced the number of IT performance issues, freeing up resources to focus on more strategic and transformative issues. The organization realized a 10X reduction in IT man hours and costs realizing a 3-year gain of about $600,000.

The table above shows the total of all benefits across the areas listed below, as well as present values (PVs) discounted at 10%. Over four years, the interviewed organization expects risk-adjusted total benefits to be a PV of nearly $4.2 million.
For the organization, Forrester assumes that:

› The composite organization had 30 incidents each month that required IT attention, including application outages, application performance issues, and high latency.

› On average, the composite organization estimated that resolving each of these incidents related to application outages and performance required 12 manhours of time across its IT organization.

› With Dell EMC All-Flash, the composite organization experienced a reduction in 90% or 27 incidents per month.

› The composite organization estimates that the rate for an IT manhour is $70.

IT resource productivity can vary with:

› The time it takes to identify and resolve application performance issues.

› The cost of an IT resource.

To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year risk adjusted PV of about $600,000.

The organization saw a 90% reduction in application performance incidents, improving IT resource productivity.

“Dell EMC XtremIO All-Flash storage comes with all the features to reduce capacity needs with data deduplication and instant data copies without impacting our application performance in our block workload environment.”

_Direct enterprise architecture, healthcare company_
The Total Economic Impact™ Of The Dell EMC All-Flash Storage Portfolio

Increased Business Productivity

In today’s ever increasing digital world, organizations need to keep pace to quickly address customer concerns and quickly react to competitive forces. In this economy, data runs king, and businesses rely on having their mission-critical applications always available and performing at high speeds.

For the composite organization, the improvement of business productivity from increased application performance and no application outages was the largest quantified benefit from investing in the Dell EMC All-Flash storage portfolio. For the organization, business user downtime went form an average 6,600 manhours per month to nearly zero manhours related to application issues.

For the organization, Forrester assumes that:
› The composite organization has 10,000 employees, and one-third of that employee base relies on tier 1 applications daily to conduct their business activity.
› Prior to Dell EMC All-Flash, the composite organization experienced on average 2 hours of performance issues on tier 1 applications a month.

### Increased IT Resource Productivity: Calculation Table

<table>
<thead>
<tr>
<th>REF.</th>
<th>METRIC</th>
<th>CALC.</th>
<th>INITIAL</th>
<th>YEAR 1</th>
<th>YEAR 2</th>
<th>YEAR 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Average number of monthly application issues and help desk tickets (outages, latency and performance issues, retiring applications) prior to Dell EMC All-Flash portfolio</td>
<td>Customer interviews</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>Number of months in a year</td>
<td></td>
<td>12</td>
<td>12</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>Number of IT manhours required to resolve application issue</td>
<td>Customer interviews</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>A4</td>
<td>Average hourly cost of IT manhour</td>
<td>Customer interviews</td>
<td>$70</td>
<td>$70</td>
<td>$70</td>
<td></td>
</tr>
<tr>
<td>A5</td>
<td>Reduction in help desk tickets from investment in Dell EMC All-Flash storage solution</td>
<td></td>
<td>90%</td>
<td>90%</td>
<td>90%</td>
<td></td>
</tr>
<tr>
<td>At</td>
<td>Improved IT resource productivity</td>
<td>A1<em>A2</em>A3<em>A4</em>A5</td>
<td>$0</td>
<td>$272,160</td>
<td>$272,160</td>
<td>$272,160</td>
</tr>
<tr>
<td>Atr</td>
<td>Improved IT resource productivity (risk-adjusted)</td>
<td></td>
<td>$0</td>
<td>$244,944</td>
<td>$244,944</td>
<td>$244,944</td>
</tr>
</tbody>
</table>

The organization achieved 99.999% application availability with reliable and fast speeds and no downtime in end user productivity.
With Dell EMC All-Flash, the composite organization now has experienced zero application outages and has achieved 99.999% performance availability.

The composite organization estimates that an hourly rate for a business resource is $30.

Business productivity can vary by:
- The percentage of business productivity that gets translated to an organization’s bottom line.
- The cost of business resources.

To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year risk adjusted PV of about $2.7 million.

### Increased Business Productivity: Calculation Table

<table>
<thead>
<tr>
<th>REF.</th>
<th>METRIC</th>
<th>CALC.</th>
<th>YEAR 1</th>
<th>YEAR 2</th>
<th>YEAR 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>Number of employees</td>
<td>10,000</td>
<td>10,000</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td>B2</td>
<td>Percentage of employees relying on tier 1 applications daily</td>
<td>33%</td>
<td>33%</td>
<td>33%</td>
<td></td>
</tr>
<tr>
<td>B3</td>
<td>Number of hours of tier 1 application performance issues per month prior to Dell EMC All-Flash</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>B4</td>
<td>Number of months in a year</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>B5</td>
<td>Average hourly burden rate of full-time employee</td>
<td>$30</td>
<td>$30</td>
<td>$30</td>
<td></td>
</tr>
<tr>
<td>B6</td>
<td>Application performance availability of applications after Dell EMC</td>
<td>99.999%</td>
<td>99.999%</td>
<td>99.999%</td>
<td></td>
</tr>
<tr>
<td>B7</td>
<td>Percentage of productivity captured by organization</td>
<td>50.00%</td>
<td>50.00%</td>
<td>50.00%</td>
<td></td>
</tr>
<tr>
<td>Bt</td>
<td>Increased business productivity</td>
<td>B1<em>B2</em>B3<em>B4</em>B5<em>B6</em>B7</td>
<td>$1,187,881</td>
<td>$1,187,881</td>
<td>$1,187,881</td>
</tr>
<tr>
<td>Btr</td>
<td>Increased business productivity (risk-adjusted)</td>
<td>↓10%</td>
<td>$1,069,093</td>
<td>$1,069,093</td>
<td>$1,069,093</td>
</tr>
</tbody>
</table>
Storage Hardware And Ongoing Maintenance Savings

The composite organization realized significant cost savings from freeing up existing servers and avoiding the cost of investing in new servers and additional storage capacity over the three years. This resulted in capex savings as new hardware did not have to be purchased, and the composite organization also saved on the annual license fees. In addition, the composite organization benefited from ease of management and automation with its All-Flash storage deployment when compared with its previous traditional storage environment. This management and support cost savings came from easier deployment activities and faster provisioning of storage. The IT infrastructure team was also able to reduce management effort with virtualization and consolidation. Using All-Flash storage instead of traditional storage also eliminated migration effort and corresponding IT infrastructure staff time spent on data migration for storage upgrades.

The organization estimated that, on an annual basis, it would invest $300,000 in storage appliances and hardware to meet its needs. With Dell EMC All-Flash, the organization can eliminate this capital expenditure amount from its budget.

The composite organization estimated Opex savings from reduced license costs and labor savings at 15% of its capex savings, totaling $45,000 a year.

Software hardware and ongoing maintenance can vary by:

- An organization’s existing storage environment and capacity availability.
- The market condition and business requirements.

To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year risk-adjusted total PV of $772,168.

### Storage Hardware And Ongoing Maintenance Savings: Calculation Table

<table>
<thead>
<tr>
<th>REF.</th>
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<th>YEAR 2</th>
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</thead>
<tbody>
<tr>
<td>C1</td>
<td>Annual Capex savings with reduced server requirements</td>
<td>$300,000</td>
<td>$300,000</td>
<td>$300,000</td>
<td>$300,000</td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td>Annual Opex savings with reduced license and support costs</td>
<td>15% of capex cost</td>
<td>$45,000</td>
<td>$45,000</td>
<td>$45,000</td>
<td></td>
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<tr>
<td>Ct</td>
<td>Storage hardware and ongoing maintenance savings</td>
<td>C1+C2</td>
<td>$0</td>
<td>$345,000</td>
<td>$345,000</td>
<td>$345,000</td>
</tr>
<tr>
<td></td>
<td>Risk adjustment</td>
<td>↓10%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ctr</td>
<td>Storage hardware and ongoing maintenance savings (risk-adjusted)</td>
<td>$0</td>
<td>$310,500</td>
<td>$310,500</td>
<td>$310,500</td>
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</tr>
</tbody>
</table>
Power And Cooling Savings

The composite organization reported significant power and cooling savings when it replaced legacy disk storage with Dell EMC All-Flash arrays. The composite organization indicated that moving to All-Flash arrays has reduced its power and cooling costs by 85%. This results in $68,000 of power and cooling savings over three years and assumes a cost per KWH for power of $0.14 and a cost or KWH for cooling of $0.10.

We have risk-adjusted the savings downward by 10% to reflect regional KWH rate differentials, yielding a three-year risk-adjusted total PV of $152,195.

### Power And Cooling Savings

<table>
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<tr>
<th>REF.</th>
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<th>YEAR 3</th>
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</thead>
<tbody>
<tr>
<td>D1</td>
<td>Legacy environment power and cooling costs per year</td>
<td></td>
<td>$80,000</td>
<td>$80,000</td>
<td>$80,000</td>
<td></td>
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<tr>
<td>D2</td>
<td>Reduction in power and cooling costs from Dell EMC All-Flash storage</td>
<td></td>
<td>85%</td>
<td>85%</td>
<td>85%</td>
<td></td>
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<tr>
<td>Dt</td>
<td>Power and cooling savings</td>
<td>D1*D2</td>
<td>$0</td>
<td>$68,000</td>
<td>$68,000</td>
<td>$68,000</td>
</tr>
<tr>
<td>Dtr</td>
<td>Power and cooling savings (risk-adjusted)</td>
<td></td>
<td>$0</td>
<td>$61,200</td>
<td>$61,200</td>
<td>$61,200</td>
</tr>
</tbody>
</table>

### Flexibility

The value of flexibility is clearly unique to each customer, and the measure of its value varies from organization to organization. There are multiple scenarios in which a customer might choose to implement All-Flash storage solutions and later realize additional uses and business opportunities. For the organization, this includes:

- Additional revenue from faster time-to-market for All-Flash storage-supported projects.
- Ability to quickly add and scale capacity for both structured and data to support new business initiatives.
- Flexibility would also be quantified when evaluated as part of a specific project (described in more detail in Appendix A).

Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could be turned into business benefit for a future additional investment. This provides an organization with the "right" or the ability to engage in future initiatives but not the obligation to do so.
Dell EMC All-Flash Storage Costs

The composite organization transitioned 1 petabyte of applications, databases, and workloads onto three Dell EMC products.

**600 TB of data onto Dell EMC VMAX All Flash:** The organization transitioned mission-critical applications including ERP, SQL Server environment, Oracle database HR, Payroll, and Purchasing onto Dell EMC VMAX All-Flash.

**300 TB of data onto Dell EMC Unity All-Flash:** The organization transitioned many of its mid-tier application portfolio and arrays onto Dell EMC Unity All-Flash to simplify operations and reduce costs.

**100 TB of data onto Dell EMC XtremIO:** The organization transitioned key tier 1 applications onto Dell EMC XtremIO to improve performance, reduce latency, and realize increased storage efficiencies with deduplication, compression, and thin provisioning features.

The composite organization incurred an initial cost to implement these three Dell EMC All-Flash storage products and transitioning 1,000 TB or 1 petabyte of data of $1,328,250.

Additionally, the composite organization experienced 10% annual maintenance and support costs for its investment in Dell EMC All-Flash storage portfolio.

The table above shows the total of all costs across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the interviewed organization expects risk-adjusted total costs to be a PV of approximately $1.85 million.

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

For the composite organization, the implementation of Dell EMC All-Flash arrays happened in two months and required 33% of four full-time equivalents (FTEs) to help deploy. This included the resource time (server administrator, storage administrator, and network administrator) associated with planning and deploying Dell EMC All-Flash arrays across VMAX, Dell EMC Unity, and XtremIO production lines. The average fully loaded monthly cost per IT staff is $12,000 for a total labor cost of $31,680 as an initial investment period expense.

On an ongoing basis, the composite organization dedicated two storage administrators to spend 20% of their time managing the Dell EMC arrays. The same average fully loaded monthly cost of $12,000 per resource applies for an annual internal labor cost of $57,600.

Storage support and ongoing management costs might vary over time. The amount of storage deployed might also change from previous plans. To account for these risks, Forrester risk-adjusted the cost of labor and ongoing management of All-Flash storage up by 5%. This yields a three-year risk-adjusted total PV of $192,415.
<table>
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<th>YEAR 3</th>
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</thead>
<tbody>
<tr>
<td>F1</td>
<td>Number of FTEs (storage administrators, network administrators, and server administrators)</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>F2</td>
<td>Percentage of time of FTE required during planning and implementation</td>
<td>33%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
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<tr>
<td>F3</td>
<td>Number of months</td>
<td>2</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>F4</td>
<td>Monthly burden rate of FTE</td>
<td>$12,000</td>
<td>$12,000</td>
<td>$12,000</td>
<td>$12,000</td>
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<tr>
<td>Ft</td>
<td>Labor and ongoing management costs</td>
<td>$31,680</td>
<td>$57,600</td>
<td>$57,600</td>
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<tr>
<td></td>
<td>Risk adjustment</td>
<td>↑10%</td>
<td></td>
<td></td>
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<tr>
<td>Ftr</td>
<td>Labor and ongoing management costs (risk-adjusted)</td>
<td>$34,848</td>
<td>$63,360</td>
<td>$63,360</td>
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</table>
Dell EMC All-Flash: Overview

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

MODERNIZE WITHOUT COMPROMISE

In today’s lightning-fast digital world, your IT Transformation wouldn’t be complete without modernizing your infrastructure with All-Flash storage. Flash is now the new storage normal thanks to its affordability, agility, efficiency and speed. And thanks to Dell EMC, organizations that adopt All-Flash can accelerate their IT Transformation. What does that mean for your business? You gain a competitive edge in the digital economy with consistent, predictable low-latency performance while dramatically reducing costs and complexity. Let Dell EMC show you how All-Flash, powered by Intel® Xeon® processors, can be a significant part of your modern infrastructure. Learn more at DellEMC.com/All-Flash.

“Dell EMC makes a promise we never fail to keep: a 100% focus on your success. We give you the best technology, literally tens of thousands of service professionals, and a level of confidence nobody else can deliver.”

—David Goulden, CEO, Dell EMC Information Infrastructure

FLASH OF BRILLIANCE

As you modernize your infrastructure, flash will be the underlying storage media that delivers the efficiencies and cost savings to help you drive digital business results. But it is Dell EMC’s architectures and software that distinguish us from the others to help you achieve new levels of success with the broadest All-Flash portfolio on the market, supported by Intel® Xeon® processors. No other storage company offers the range of products and solutions designed to transform your business like Dell EMC. Our entire storage portfolio combines maximum efficiency with investment value.

Performance:

3x faster, ultra-low latency, and sub-millisecond response times ensure mission-critical applications are always available and responsive with consistent and predictable performance. Drive workload consolidation and eliminate single workload silos.

Availability:

Always on with up to 99.9999% availability. World-class solutions combine disaster recovery with business continuity and data protection.

Scale:

Entry level to enterprise solutions, so you can start small and grow big without losing performance. Scale to 92.4 PB of capacity in a single cluster.

Low TCO and fast ROI:

Reduce costs by up to 80% over three years, including 5.8x lower storage admin costs with simple deployment, inline data compression, reduced management complexity, and less power, space, and cooling requirements. Store 6x more data than traditional disk-based storage systems.

Converged Infrastructure:

Deploy fully optimized, ready-to-go All-Flash platforms to run your core business applications and services.
Appendix A: Total Economic Impact

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

Total Economic Impact Approach

**Benefits** represent the value delivered to the business by the product. The TEI methodology places equal weight on the measure of benefits and the measure of costs, allowing for a full examination of the effect of the technology on the entire organization.

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

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

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

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