A Forrester Total Economic Impact™
Study Commissioned By IBM
August 2020

The Total Economic Impact™ Of IBM Storage For SAP HANA

Cost Savings And Business Benefits Enabled By IBM Storage For SAP HANA

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ABOUT FORRESTER CONSULTING

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Key Benefits And Costs

Avoided cost of unplanned downtime:
$84,553

Increased developer productivity due to improved runtimes:
$71,342

Cost of IBM Storage solution:
$74,998

Executive Summary

IBM offers flash storage and modern data protection solutions that enable organizations to improve the responsiveness and resiliency of their SAP applications, as well as automation tools and straightforward, easy-to-use features that equip businesses to improve productivity. IBM commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying IBM Storage for SAP HANA.

The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of the IBM Storage for SAP HANA on their organizations. To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed four customers and two service providers with years of experience using IBM Storage for SAP HANA.

Prior to using IBM Storage for SAP HANA, the customers had heterogenous storage environments and, in some instances, faced end-of-life replacement decisions. The customers were primarily concerned with finding a reliable solution that could support their current storage needs and migration to SAP HANA, as well as provide the flexibility to support additional changes to their infrastructure as they began leveraging hybrid multicloud-based opportunities or increasing their mobile presence.

A vice president at a regional financial services firm explained that the "storage platform has to be resilient, has to be scalable, and has to be secure." He added that the solution his firm sought would "hold the crown jewels for the organization, so definitely security around these particular paths is [of] the utmost importance."

After moving to IBM Storage for SAP HANA, a service provider in Europe noted the improved resiliency and responsiveness achieved for a client: "Not a microsecond of outage since go-live, which is . . . more than two years already now. We have perfect throughput or response time. . . . You need a file or record — it's there."

A general manager based in Asia expounded on the benefits his organization achieved: "Using IBM Storage enabled us to leverage the most critical applications and platforms in a seamless and efficient way that led us to gain greater insight with analytics and faster business process execution, saving time and costs, learning more about our products and markets to serve them better, ultimately leading to more revenue for the company."

Key Findings

Quantified benefits. The following risk-adjusted present value (PV) quantified benefits are representative of those experienced by the companies interviewed:

- **Reduced unplanned downtime valued at $84,553.** Improvements in the reliability and resiliency of SAP HANA applications reduced unplanned downtime by 4 hours a year from previous environments.
- **Increased developer productivity amounting to $71,342.** Lower latency, reduced test times, and simplified provisioning enabled developers to improve productivity by 5%.

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ROI
279%

Benefits PV
$296,306

NPV
$218,170

Payback
7 months

- **Increased productivity of storage administrators worth $67,378.** Automation features reduced the effort needed from storage administrators by an average of 15%, allowing them to focus on other productive tasks.
- **Increased productivity of backup administrators measured at $45,183.** Automation features reduced the effort needed from backup administrators by an average of 15%, allowing them to focus on other productive tasks.
- **Reduced wait time for end users assessed at $27,850.** End users experienced a reduction of system wait times by 15 minutes a day and improved responsiveness.

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

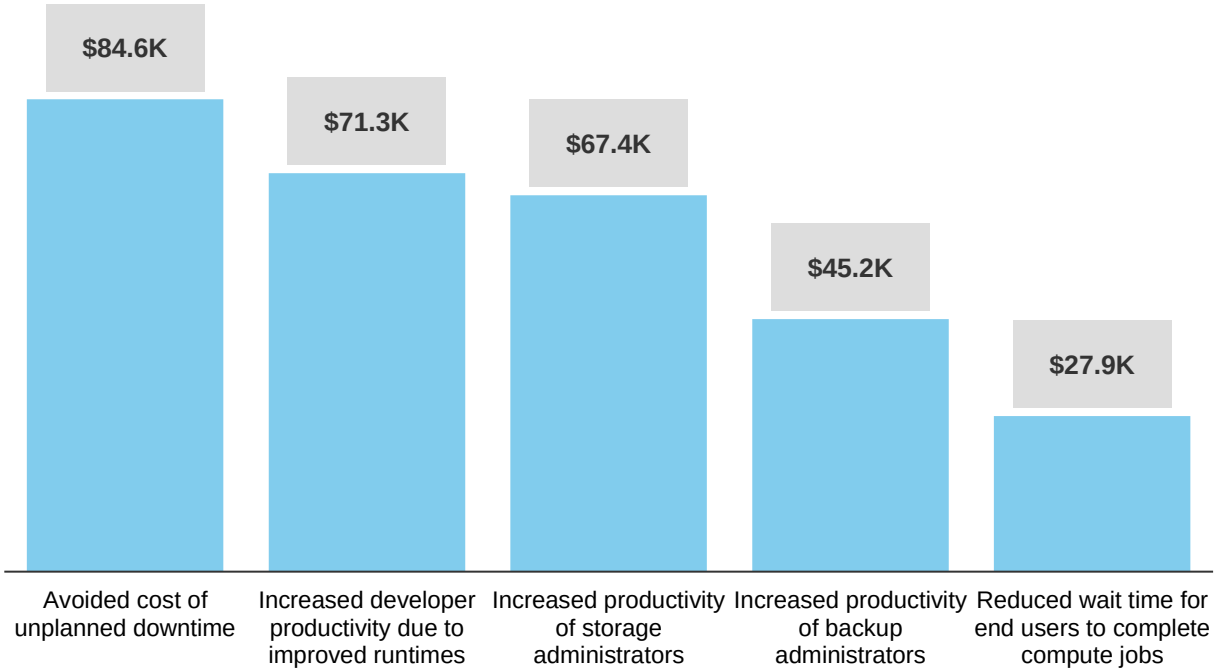
- **Improved operational efficiency.** The interviewed organizations suggested that the on-demand reports and analytics they get from IBM provide real-time insights into their business that translate into obtainable improvements to operational efficiency.
- **Integrated artificial intelligence (AI) and machine learning (ML) capabilities.** The interviewed organizations discussed how IBM storage gave them a reliable platform on which they could operate SAP HANA, including integrating AI and ML capabilities into their organizations.
- **Enhanced efficiency of security and compliance efforts.** The interviewed organizations indicated that compliance and regulatory obligations can require multiple security layers, creating greater data demands that could impact customer experience. IBM Storage for SAP HANA meets those demands with no noticeable impact to users and customers.

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

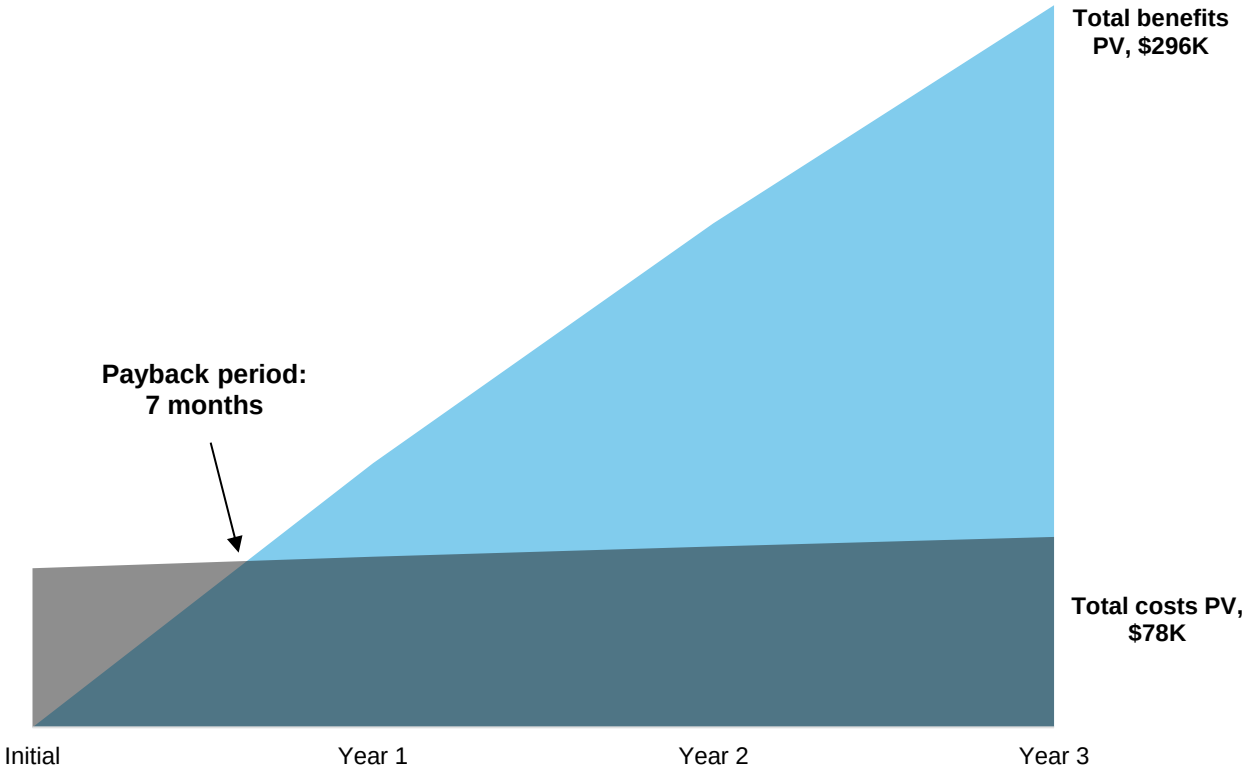
- **Price of IBM Storage solution at $74,998.** This component includes an installed IBM Storage solution with annual maintenance and software subscriptions and support for IBM Spectrum Protect and Spectrum Copy Data Management for three years.
- **Cost of IT administrator effort to optimize environment at $3,138.** This component includes the portion of time spent by IT administrators configuring and optimizing the storage environment for four weeks.

Forrester's interviews with four existing customers and two service providers and the subsequent financial analysis found that an organization based on these interviewed organizations experiences benefits of $296,306 over three years versus costs of $78,136, adding up to a net present value (NPV) of $218,170 and an ROI of 279%.

(Three-Year)



Financial Summary



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TEI Framework And Methodology

From the information provided in the interviews, Forrester has constructed a Total Economic Impact™ (TEI) framework for those organizations considering implementing IBM Storage for SAP HANA.

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 IBM Storage for SAP HANA can have on an organization:

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

DUE DILIGENCE
Interviewed IBM stakeholders and Forrester analysts to gather data relative to IBM Storage for SAP HANA.

CUSTOMER INTERVIEWS
Interviewed six organizations using IBM Storage for SAP HANA 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 interviews using the TEI methodology and risk-adjusted the financial model based on issues and concerns of the interviewed organizations.

CASE STUDY
Employed four fundamental elements of TEI in modeling IBM Storage for SAP HANA's 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 IBM 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 IBM Storage for SAP HANA.

IBM 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.

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

The IBM Storage Customer Journey

BEFORE AND AFTER THE INVESTMENT IN IBM STORAGE FOR SAP HANA

Interviewed Organizations

For this study, Forrester conducted six interviews with IBM Storage for SAP HANA customers and service providers. Interviewees include the following:

INDUSTRY	REGION	INTERVIEWEE	FLASH STORAGE REQUIREMENTS
Manufacturing	Central Asia	General manager, information services	3 terabytes
Financial services	North America	Vice president and information security officer	500 terabytes
Financial services	Global, headquartered in Europe	Global Information and records management COO	3 petabytes
Financial services	Global, headquartered in North America	Director of IT	Over 1 petabyte
Service provider	Europe	Senior IT solution architect	Assorted
Service provider	Europe	IT architect and project leader	Assorted

Key Challenges

The interviewees shared key challenges and problems their organizations were facing that factored into their search for a solution. Those challenges included:

- **Facing end-of-life replacement decision.** The interviewed COO told Forrester: "We were going from the legacy environment, like six years old. . . . Our environment usually depreciates over five years for the hardware and software." She added: "We were paying maintenance on this kit and it was very expensive."
- **Migrating to SAP S/4 HANA.** The general manager stated: "We wanted to upgrade our application landscape to SAP S/4 HANA, and the current hardware was not compatible, which led us to upgrade and scale for the future as well."
- **Leveraging hybrid multicloud workloads/SaaS.** The vice president said: "As the business starts to migrate or basically leveraging more workloads in the cloud or in SaaS, we noticed that the traditional storage of the SSD, as well as the SANs and NAS, is not scalable. It's not able to provide the business functionality that it was called for."[1]

> "As the business starts to migrate or basically leveraging more workloads in the cloud or in SaaS, we noticed that the traditional storage of the SSD, as well as the SANs and NAS, is not scalable. It's not able to provide the business functionality that it was called for."
>
> *Vice president, financial services*

Key Results

The interviews revealed that key results from the IBM Storage for SAP HANA investment include:

- **Improved reliability of storage.** The director of IT explained that IBM Storage "did self-healing and has a very active infrastructure, with its monitoring and analytics capabilities, [that] allows you to foresee in advance any potential failures, boosting the overall reliability."

- **Improved performance of storage.** The interviewees reported unplanned downtime was minimal and, in some cases, had not occurred at all since the implementation of IBM Storage. They also said that the solution was responsive to user demands with minimal wait time.
- **Simplified administration.** The COO explained: "The automation was put in place, and we were able to fine-tune the scripting to make sure that we were accommodating the failovers and migrations better, and it was tweaking things and getting better. Our skill sets got better, too, and once we got the momentum going, we got the expertise, and we also got the automation in place." She added, "With the IBM solution, we were able to put front-office apps on it, and when we put the data on Flash, we saw a huge jump in performance."

"With the IBM solution, we were able to put front-office apps on it, and when we put the data on Flash, we saw a huge jump in performance."

COO, financial services

Composite Organization

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

- **Description of composite.** The composite organization is a multiregional company with continuous, 24-hour system availability needs. It uses a mix of storage hardware and is facing an end-of-life replacement decision for storage of four instances of a 2 terabyte SAP HANA database.
- **Deployment characteristics.** The composite deploys IBM Storage solution with 24 terabytes of usable capacity along with IBM's Spectrum Protect and Spectrum Copy Data Management software.

Analysis Of Benefits

QUANTIFIED BENEFIT DATA AS APPLIED TO THE COMPOSITE

Total Benefits

REF.	BENEFIT	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Atr	Avoided cost of unplanned downtime	$34,000	$34,000	$34,000	$102,000	$84,553
Btr	Increased developer productivity due to improved runtimes	$28,688	$28,688	$28,688	$86,063	$71,342
Ctr	Increased productivity of storage administrators	$27,094	$27,094	$27,094	$81,281	$67,378
Dtr	Increased productivity of backup administrators	$18,169	$18,169	$18,169	$54,506	$45,183
Etr	Reduced wait time for end users to complete compute jobs	$11,199	$11,199	$11,199	$33,596	$27,850
	Total benefits (risk-adjusted)	$119,149	$119,149	$119,149	$357,446	$296,306

The table above shows the total of all benefits across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the composite organization expects risk-adjusted total benefits to be a PV of $296,306.

Avoided Cost Of Unplanned Downtime

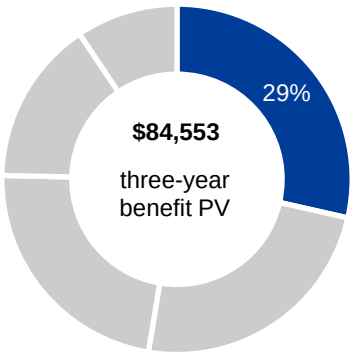
The interviewed organizations estimated that on their prior storage environments, unplanned downtime of their SAP environment occurred, on average, every three to four months. One executive explained, “We migrated everything over into our facilities, and since we started with their operation, we have had availability of 100.00%.”

Unplanned downtime can hinder work for personnel in finance, procurement, and other key functions. It can also disrupt production on the manufacturing floor and block customers from making and confirming orders.

For the composite organization, Forrester assumes that:

- Unplanned downtime decreases by 4 hours per year.
- The average cost per hour of downtime is $10,000. Interviewees expressed costs that ranged from a couple thousand dollars to hundreds of thousands of dollars per hour.

To account for the range of responses in the interviews, Forrester adjusted this benefit downward by 15%, yielding a three-year risk-adjusted total PV of $84,553.



Avoided cost of unplanned downtime: 29% of total benefits

Avoided Cost Of Unplanned Downtime: Calculation Table

REF.	METRIC	CALCULATION	YEAR 1	YEAR 2	YEAR 3
A1	Average reduction of unplanned downtime (hours per year)	From interviews	4	4	4
A2	Cost to organization per hour	From interviews	$10,000	$10,000	$10,000
At	Avoided cost of unplanned downtime	A1*A2	$40,000	$40,000	$40,000
	Risk adjustment	↓15%			
Atr	Avoided cost of unplanned downtime (risk-adjusted)		$34,000	$34,000	$34,000

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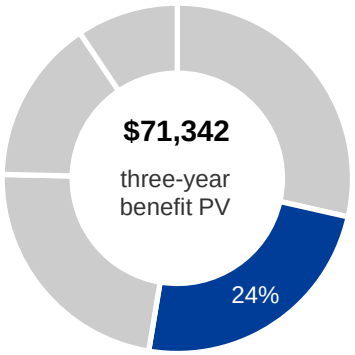
Increased Developer Productivity Due To Improved Runtimes

After installing IBM Storage for SAP HANA, the interviewed organizations noted a reduction in request latency and improvements in runtimes. One of the executives explained: “I had to guarantee not to exceed 20 milliseconds for average user response time in 80% of the transactions in SAP. That was the customer’s requirement. Today we achieve less than 10 milliseconds in more than 90% of all transactions because the storage response is immediate.”

The composite organization has 15 developers who experience a savings of work time of 5%, 50% of which the developers apply to other productive work tasks.

To account for any variation that readers may experience, Forrester adjusted this benefit downward by 10%, yielding a three-year risk-adjusted total PV of $71,342.



Increased developer productivity due to improved runtimes: 24% of total benefits

Increased Developer Productivity Due To Improved Runtimes: Calculation Table

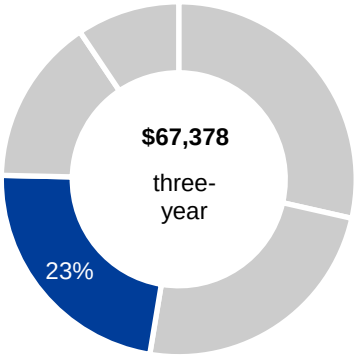
REF.	METRIC	CALCULATION	YEAR 1	YEAR 2	YEAR 3
B1	Number of developers using IBM Storage	From interviews	15	15	15
B2	Percentage of time saved using IBM Storage	From interviews	5%	5%	5%
B3	Average burdened salary		$85,000	$85,000	$85,000
B4	Percentage of time saved applied to work tasks		50%	50%	50%
Bt	Increased developer productivity due to improved runtimes	B1*B2*B3*B4	$31,875	$31,875	$31,875
	Risk adjustment	↓10%			
Btr	Increased developer productivity due to improved runtimes (risk-adjusted)		$28,688	$28,688	$28,688

Increased Productivity Of Storage Administrators

IBM Storage for SAP HANA provides storage administrators a simple, straightforward interface and automation features that reduce the amount of effort needed to manage day-to-day tasks. The interviewees reported needing less effort after installing IBM Storage for SAP HANA than before. The COO discussed how IBM Storage improved storage management: “If I’m a business line and I need storage, I just order it, and it is fully automated.”

The vice president explained that the new solution “helps us in terms of having a single pane of glass to be able to see very different components in terms of how they operate, as well as how they communicate at various different areas. . . . That single pane of glass helps the storage team and the network team understand where’s the fault line, as well as where we basically improve — especially nowadays when we might have a lot of workloads from on-prem to the cloud.”

The composite organization in this model has five storage administrators whose workload decreases 15% with the new storage system. The model assumes admins apply 50% of saved time to work tasks. Forrester adjusted this benefit downward by 15% to account for any variation that readers may experience, resulting in a three-year risk adjusted total present value of $67,378.



Increased productivity of storage administrators: 23% of total benefits

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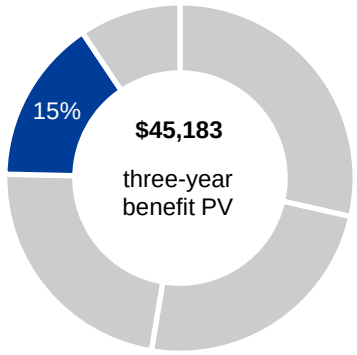
Increased Productivity Of Storage Administrators: Calculation Table					
REF.	METRIC	CALCULATION	YEAR 1	YEAR 2	YEAR 3
C1	Number of storage admins	From interviews	5	5	5
C2	Percentage of time saved managing IBM Storage	From interviews	15%	15%	15%
C3	Average burdened salary	From interviews	$85,000	$85,000	$85,000
C4	Percentage of time saved applied to work tasks		50%	50%	50%
Ct	Increased productivity of storage administrators	C1*C2*C3*C4	$31,875	$31,875	$31,875
	Risk adjustment	↓15%			
Ctr	Increased productivity of storage administrators (risk-adjusted)		$27,094	$27,094	$27,094

Increased Productivity Of Backup Administrators

Interviewees mentioned automation features and a simplified interface as contributing factors to a reduced workload and increased productivity of backup administrators.

For the composite organization, three backup administrators save 15% of the time previously spent managing SAP storage.

To account for any variation readers may experience, Forrester adjusted this benefit downward by 5%, yielding a three-year risk-adjusted total PV of $45,183.



Increased productivity of backup administrators: 15% of total benefits

Increased Productivity Of Backup Administrators: Calculation Table					
REF.	METRIC	CALCULATION	YEAR 1	YEAR 2	YEAR 3
D1	Number of admins	From interviews	3	3	3
D2	Percentage of time saved managing IBM Storage	From interviews	15%	15%	15%
D3	Average burdened salary	From interviews	$85,000	$85,000	$85,000
D4	Percentage of time saved applied to work tasks		50%	50%	50%
Dt	Increased productivity of backup administrators	D1*D2*D3*D4	$19,125	$19,125	$19,125
	Risk adjustment	↓5%			
Dtr	Increased productivity of backup administrators (risk-adjusted)		$18,169	$18,169	$18,169

Reduced Wait Time For End Users To Complete Compute Jobs

SAP end users at interviewed organizations also experienced the reduction in request latency and improvements in runtimes noted for developers.

For the composite organization, 100 business users experience a daily 15-minute reduction in the waiting time for issue resolution. The implementation to SAP HANA and other hardware installations may have also contributed to this benefit, so Forrester attributed 10% of the reduction in wait time to IBM Storage for SAP HANA.

To account for any variation that readers may experience, Forrester adjusted this benefit downward by 15%, yielding a three-year risk-adjusted total PV of $27,850.

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

Reduced Wait Time For End Users To Complete Compute Jobs: Calculation Table

REF.	METRIC	CALCULATION	YEAR 1	YEAR 2	YEAR 3
E1	Number of business users were affected by SAP HANA performance problems	From interviews	100	100	100
E2	Reduction of average daily duration waiting for issue to resolve (minutes)	From interviews	15	15	15
E3	Equivalent full-time employees lost due to run times (rounded)	B1*B2/(480 mintues per day)	3.1	3.1	3.1
E4	Average burdened salary		$85,000	$85,000	$85,000
E5	Reduction in wait time attributable to IBM Storage	From interviews	10%	10%	10%
E6	Percentage of time saved applied to work tasks		50%	50%	50%
Et	Reduced wait time for end users to complete compute jobs	E3*E4*E5*E6	$13,175	$13,175	$13,175
	Risk adjustment	↓15%			
Etr	Reduced wait time for end users to complete compute jobs (risk-adjusted)		$11,199	$11,199	$11,199

Unquantified Benefits

Interviewees discussed additional benefits that did not have quantifiable impacts to the organizations. The executives presented the unquantified items below as additional obtainable benefits as a result of implementing IBM Storage for SAP HANA.

- **Improved operational efficiency.** The general manager said, “IBM Storage is providing us an efficient platform to run tools that enable us to get these insights in real time and make valuable decisions in time.” A service provider suggested that for one client, “they do some very sophisticated production planning to calculate the exact load for all the production lines, and that runs now in a split of the time than before. So they can do it more often, more accurately, and they could increase the load on their production lines by some percent, just thanks to a faster planning. . . . That’s the direct result of using faster infrastructure, with results at the production line and machinery they’re running.”

- **Integrated AI/ML capabilities.** The manufacturing executive said, “With IBM storage running the backstage, we are confident to explore those new opportunities, whether it’s AI or RPA [robotic process automation].”
- **Improved efficiency of security and compliance efforts.** The vice president of the financial services firm noted, “One of the key things to take away is that it definitely reduced the complexity.” He added: “As a heavily regulated entity . . . we’re going to put additional encryption lines and . . . they’re going to have some retrieval latency. . . . It definitely has a load and impact. Many of these applications, especially in mobile, need to be encrypted. They need to be protected in terms of cybersecurity protection. So, therefore, you want to make sure that the throughput . . . is not a burden to the application, and this is why such high performance is much needed. . . . Without a fast, reliable system, any additional security requirements on top of that particular web stream will have an adverse effect on the user experience.”

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 IBM Storage for SAP HANA and later realize additional uses and business opportunities, including:

- **Enhanced mobile opportunities.** The vice president noted that IBM Storage “enabled the business to be more digitally transformed. Without this platform, the adaptation will be much, much slower.” He continued, “We are accelerating our mobile design because we have the necessary infrastructure on the back end to support it and enable the business to provide more content, which means we can hopefully generate a new revenue source.”
- **Expanded ability to leverage a hybrid multicloud environment.** The COO said, “We felt that IBM had not just the hardware, but also the recognition to help us transform in our environment and get to the cloud.” She also said, “To go to the cloud is very difficult from a legacy environment so, with IBM, we have the right tooling, we know which applications are cloud-friendly and which ones we can migrate . . . which ones we can really innovate and bring to the cloud, which actually will reduce our costs even further.”

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.

Analysis Of Costs

QUANTIFIED COST DATA AS APPLIED TO THE COMPOSITE

Total Costs

REF.	COST	INITIAL	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Ftr	Cost of IBM Storage solution	$62,200	$5,146	$5,146	$5,146	$77,638	$74,998
Gtr	Cost of IT admin effort to optimize environment	$3,138	$0	$0	$0	$3,138	$3,138
	Total costs (risk-adjusted)	$65,339	$5,146	$5,146	$5,146	$80,777	$78,136

Cost Of IBM Storage Solution

The composite organization purchases an IBM Storage solution with 24 terabytes of usable capacity along with annual hardware maintenance and software subscriptions and support for IBM Spectrum Protect and Spectrum Copy Data Management for three years.

To account for potential variation on the configuration readers may consider, Forrester adjusted this cost upward by 10%, yielding a three-year risk-adjusted total PV of $74,998.

The table above shows the total of all costs across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the composite organization expects risk-adjusted total costs to be a PV of $78,136.

Cost Of IBM Storage Solution : Calculation Table

REF.	METRIC	CALCULATION	INITIAL	YEAR 1	YEAR 2	YEAR 3
F1	Cost of IBM Storage solution	From interviews	$56,546	$4,678	$4,678	$4,678
Ft	Cost of IBM Storage solution	F1	$56,546	$4,678	$4,678	$4,678
	Risk adjustment	↑10%				
Ftr	Cost of IBM Storage solution (risk-adjusted)		$62,200	$5,146	$5,146	$5,146

Cost Of IT Admin Effort To Optimize Environment

Some of interviewed executives discussed the straightforward graphical user interface (GUI) and the ease with which they were able to implement IBM Storage for SAP HANA at their organizations. Other executives reported needing some effort to optimize their storage environments and fully realize the potential benefits.

Forrester calculated that the composite organization's eight IT administrators spend 5% of their time for four weeks fine-tuning the various features of the solution and optimizing the organization's storage environment.

To account for the variation readers may experience in the effort needed to optimize the available features of IBM Storage for SAP HANA, Forrester adjusted this cost upward by 20%, yielding a three-year risk-adjusted total PV of $3,138.

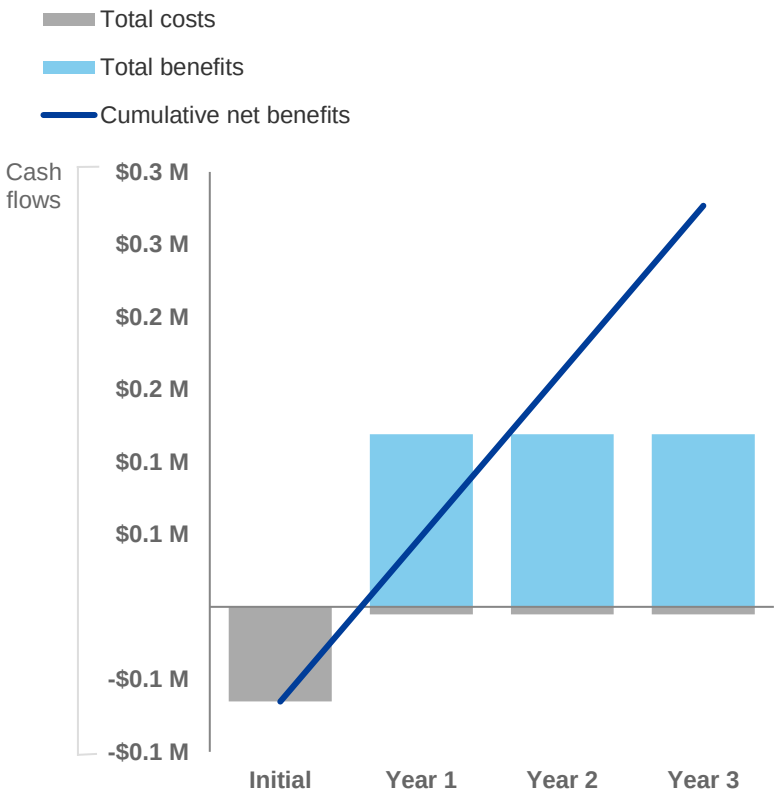
Implementation risk is the risk that a proposed investment may deviate from the original or expected requirements, resulting in higher costs than anticipated. The greater the uncertainty, the wider the potential range of outcomes for cost estimates.

Cost Of IT Admin Effort To Optimize Environment: Calculation Table						
REF.	METRIC	CALCULATION	INITIAL	YEAR 1	YEAR 2	YEAR 3
G1	Number of admins		8			
G2	Percentage of time spent optimizing IBM Storage		5%			
G3	Duration of integration/configuration (weeks)		4			
G4	Average burdened salary		$85,000			
Gt	Cost of IT admin effort to optimize environment	G1*G2*G3*(G4/52)	$2,615	$0	$0	$0
	Risk adjustment	↑20%				
Gtr	Cost of IT admin effort to optimize environment (risk-adjusted)		$3,138	$0	$0	$0

Financial Summary

CONSOLIDATED THREE-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 composite organization's investment. Forrester assumes a yearly discount rate of 10% for this analysis.

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

Cash Flow Analysis (risk-adjusted estimates)

	INITIAL	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Total costs	($65,339)	($5,146)	($5,146)	($5,146)	($80,777)	($78,136)
Total benefits	$0	$119,149	$119,149	$119,149	$357,446	$296,306
Net benefits	($65,339)	$114,003	$114,003	$114,003	$276,669	$218,170
ROI						279%
Payback period (months)						7.0

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IBM Storage For SAP HANA: Overview

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Data is a key driver of competitive advantage and organizations are moving to SAP HANA to generate deeper insights faster. Despite being an in-memory database, SAP HANA must be supported by persistent storage to ensure consistent data availability. IBM Storage systems and software solutions provide the ideal combination of resiliency and flexibility to cost-effectively meet the SAP HANA data access, delivery, management and protection demands in a hybrid multicloud world. Learn more about the IBM portfolio of storage solutions for SAP HANA at ibm.com/it-infrastructure/storage/sap-hana.

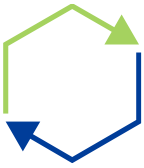
Appendix A: Total Economic Impact

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

Total Economic Impact Approach

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

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



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

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

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

Present value (PV)

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

Net present value (NPV)

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

Return on investment (ROI)

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

Discount rate

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

Payback period

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

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Appendix B: Endnotes

[1] SaaS: software-as-a-service; SSD: solid-state drive; SAN: storage area network; NAS: network-attached storage