

A Forrester Total Economic
Impact™ Study
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Project Director:
Jon Erickson

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The Total Economic Impact™ Of IBM Storwize V7000 With Real-Time Compression

Cost Savings And Business Benefits

FORRESTER®

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Executive Summary

In October 2013, 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 Storwize V7000 with Real-time Compression. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of Storwize V7000 with Real-time Compression on their organizations.

To better understand the benefits, costs, and risks associated with a Storwize V7000 with Real-time Compression implementation, Forrester interviewed several customers with multiple years of experience using Storwize V7000 with Real-time Compression. Storwize V7000 is a virtualized storage system designed to consolidate block and file workloads into a single storage system for simplified management, reduced cost, scalable capacity, performance, and high availability. Storwize V7000 with Real-time Compression provides additional levels of storage efficiency through compression of an organization's primary storage environment.

Prior to Storwize V7000 with Real-time Compression, customers had limited storage virtualization and compression technologies within their storage environments. With the rapid growth of their primary storage environments and need for high data availability, there was a requirement to make storage environments more efficient and effective through storage virtualization. With Storwize V7000 with Real-time Compression, customers were able to improve the time it took to provision data, improve staff efficiency, and improve the capital efficiency of their primary storage environments. According to one storage administrator, "Storwize V7000 with Real-time Compression allowed us to transform our storage environment, and shift from reactive to proactive [response] in storage allocation and provisioning."

IBM STORWIZE V7000 WITH REAL-TIME COMPRESSION RESULTS IN STORAGE EFFICIENCY

Our interviews with four existing customers and our subsequent financial analysis found that a representative organization based on these companies experienced the risk-adjusted ROI, benefits, and costs shown in Figure 1.¹ See Appendix A for a description of the representative organization.

Organizations realized different types of data compression and resulting savings and ROI based on the type of data that was being compressed. Forrester modeled a scenario of a mixed data compression environment. However, organizations that have more homogeneous data environments could see different compression rates and resulting ROI. Table 1 illustrates how the resulting ROI for Storwize with Real-time Compression may vary due to differing compression rates.

Storwize V7000 with Real-time Compression can help save costs and improve storage effectiveness.

The costs and benefits for an aggregated, representative organization, based on customer interviews, are:

- **Investment costs: \$742,174.**
- **Total cost savings and benefits: \$1,581,287.**

TABLE 1
ROI Differences Resulting From Differences In Compressed Storage

Impact of RTC	Compression rates	Value of RTC	ROI without RTC	ROI with RTC
Database	70%	467,701	39%	165%
Virtualization	60%	400,887	39%	146%
Email	40%	267,258	39%	108%
Visual assets	55%	367,479	39%	137%
Rep. Organization	65%	434,294	39%	156%

Source: Forrester Research, Inc.

This table's data translates to benefits of more than \$1,581,287 over three years, implementation costs of \$742,174, and an NPV of \$839,113. With Storwize V7000 with Real-time Compression, average compression rates for primary storage was 65% and the representative organization experienced additional savings in provisioning, hardware, and administration.

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



Source: Forrester Research, Inc.

- › **Benefits.** The representative organization experienced the following risk-adjusted benefits that represent those experienced by the interviewed companies:
- **Improved primary storage compression.** This benefit represents the improvement in compression of the primary storage environment.
 - **Lower provisioning cost.** This benefit represents the reduction in provisioning cost with preinstalled thin provisioning software.
 - **Lower administrative cost per TB of storage.** This benefit represents the reduction in administrative costs of managing storage measured by cost per TB of data.
 - **Simplified application performance tuning.** This benefit represents the reduction in IT effort resulting from simplification in application performance tuning.
 - **Improved speed to get new storage online.** This benefit represents the improvement in time to get new storage in operation.
- › **Costs.** The representative organization experienced the following risk-adjusted costs:
- **Hardware costs and support fees.** This cost represents the investment in hardware and its related support costs.
 - **Software license and maintenance costs.** This cost represents the investment in software licenses and support costs for Storwize V7000 with Real-time Compression implementation.
 - **Internal implementation costs.** This cost represents the internal resources used to support the implementation.
 - **Administrative costs.** This cost represents the ongoing administrative effort associated with the deployment of IBM Storwize V7000 with Real-time Compression.

Disclosures

The reader should be aware of the following:

The 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 return on investment 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/Storwize V7000 with Real-time Compression.

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.

The customer names for the interviews were provided by IBM. IBM did not participate in customer interviews.

TEI Framework And Methodology

INTRODUCTION

From the information provided in the interviews, Forrester constructed a Total Economic Impact™ (TEI) framework for those organizations considering implementing IBM Storwize V7000 with Real-time Compression. The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision.

APPROACH AND METHODOLOGY

Forrester took a multistep approach to evaluate the impact that IBM Storwize V7000 with Real-time Compression can have on an organization (see Figure 2). Specifically, we:

- › Interviewed IBM marketing, sales, and/or consulting personnel, along with Forrester analysts, to gather data relative to Storwize V7000 with Real-time Compression and the marketplace for Storwize V7000 with Real-time Compression.
- › Interviewed four organizations currently using IBM Storwize V7000 with Real-time Compression to obtain data with respect to costs, benefits, and risks.
- › Designed a representative organization based on characteristics of the interviewed organizations (see Appendix A).
- › Constructed a financial model representative of the interviews using the TEI methodology. The financial model is populated with the cost and benefit data obtained from the interviews as applied to the representative organization.
- › Adjusted for risk, which is a key part of the TEI methodology. While interviewed organizations provided cost and benefit estimates, some categories included a broad range of responses or had a number of outside forces that might have impacted them higher or lower. For that reason, some cost and benefit totals have been risk-adjusted, and are detailed in each relevant section.

Forrester employed four fundamental elements of TEI in modeling IBM Storwize V7000 with Real-time Compression's service: **Benefits, Costs, Flexibility and Risks**.

Given the increasing sophistication that enterprises have regarding ROI analysis related to IT investments, Forrester's TEI methodology serves to provide a complete picture of the total economic impact of purchase decisions. Please see Appendix B for additional information on the TEI methodology.

FIGURE 2
TEI Approach



Source: Forrester Research, Inc.

Analysis

REPRESENTATIVE ORGANIZATION

For this study, we conducted a survey of six existing customers and a total of four interviews with representatives from the following companies, which are IBM customers based in the US and Europe:

- › A European medical services organization with over 3,000 employees and 600 clients located in Europe and North America.
- › A North American creative design agency serving Fortune 500 clients with graphics and animation projects.
- › A European financial services firm.
- › A North American retail organization.

Based on the interviews, Forrester constructed a TEI framework, a representative company, and an associated ROI analysis that illustrates the areas financially affected.

INTERVIEW HIGHLIGHTS

Findings from these interviews contributed to the creation of the representative analysis for this study. As a result of the interviews, several common themes were seen across the interviewed organizations:

- › Organizations needed to upgrade their information management systems to cope with the increasing data volume demand and continue providing an excellent quality of service to their expanding customer bases.
- › The integration of Storwize V7000 has offered a number of efficiency savings to these organizations' IT infrastructures. Thin provisioning enabled the IT teams to manage the increasing volume of data at a lower cost through better use of disk space. Organizations were able to realize, on average, a reduction of 30% in physical disk space growth while meeting their growing demands with less disruption.
- › Organizations noted that Storwize V7000 was able to identify idle storage space and use this space efficiently. Data access and management has enabled these organizations to better understand their customers, analyze customer data in a timely manner, and offer solutions and services that are better aligned with customer demand.

“Storwize with Real-time Compression gave us the ability to grow with flexibility.”

~Director, storage administration

Solution

The representative organization selected Storwize V7000 with Real-time Compression for its ability to provide a configurable out-of-the-box solution that minimized the amount of customization required by the organization and for its breadth of functionalities and strong industry capabilities.

Results

Several benefits drove the analysis:

- › **Better control over the growth of data.** The most significant benefit experienced was the flexibility of controlling physical growth and storage cost.
- › **Making storage administrators more efficient.** Storwize V7000 with Real-time Compression allowed administrators to better manage their primary and secondary storage environments, reducing the time to provision and load balance the storage environments.

BENEFITS

The benefits that we had sufficient data to quantify financially were:

- › Lower administrative cost per TB of storage.
- › Simplified application performance tuning.
- › Lower provisioning cost due to preinstalled thin provisioning software.
- › Improved speed to get new storage online.
- › Improved cost efficiency through compression.

+ Lower administrative cost

In addition to the business benefits, there are a number of IT benefits resulting from the implementation of Storwize V7000. The first is a reduction in administrative costs. Customers surveyed cited as much as a 25% year-over-year increase in volume of data stored, which results in an increase in human resources required to manage storage capacity, applications availability and rollout, and guarantee reliable access to the data to ensure that the organization met its internal and external SLAs. The interviewees noted that after deployment, they were able to shrink total storage size by as much as 65%. This action allowed the organizations to manage storage growth with the existing number of staff.

For the composite organization, we estimate that a full-time employee was allocating 50% of his or her time to ongoing administrative tasks. After deployment of Storwize V7000, the organization was able to reduce the cost to administer virtualized storage by 19%. While the organization improved overall system efficiency, the benefit didn't occur until Year 2 because there was no incremental increase per terabyte of data in Year 1. Table 2 illustrates the calculation.

TABLE 2

Lower Administrative Cost

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
A1	Number of workers managing storage			5	5
A2	Average fully loaded salary			\$135,000	\$135,000
A3	Average time allocated to administrative time			50%	50%
A4	Reduction in cost to administer storage compared with previous environment on a per TB basis			19%	19%
At	Lower administration cost	$A1 * A2 * A3 * A4 * A5$		\$64,125	\$64,125
Atr	Risk adjustment		↓ 2%		
	Lower administration cost (risk-adjusted)			\$62,843	\$62,843

Source: Forrester Research, Inc.

★ Simplified performance tuning

Another benefit is improvement in application tuning. Customers noted that simplifying ways to move data consistently between applications and storage devices without experiencing application downtime was an important factor when

evaluating IBM Storwize V7000. IT organizations use tuning to improve performance if the system is experiencing response time or throughput problems. To improve performance, organizations were required to make additional investments to add more disk storage and CPUs while improving CPU speed and increasing memory. By simplifying tasks related to application performance tuning, Storwize V7000 customers interviewed said that they were able to reduce the cost of tuning performance for applications per terabyte by 10% when compared with their prior environments.

For the composite organization, we estimate that the equivalent of five full-time resources were allocating 20% of his/her time to tasks related to application tuning. To calculate this benefit, we estimate the reduction in cost per terabyte of data increased compared with the environment prior to implementation of IBM Storwize V7000. Table 3 illustrates the calculation.

TABLE 3
Simplified Performance Tuning

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
B2	Number of workers managing storage		5	5	5
B3	Average fully loaded salary		\$120,000	\$120,000	\$120,000
B4	Average time allocated to performance tuning		15%	15%	15%
B5	Reduction in cost to perform application tuning compared to your previous environment		20%	20%	20%
Bt	Simplified application performance tuning		\$18,000	\$18,000	\$18,000
Btr	Risk adjustment		↓ 2%		
BT	Improved performance tuning (risk-adjusted)		\$13,230	\$17,640	\$17,640

Source: Forrester Research, Inc.

★ Lower provisioning cost

The Storwize V7000 thin provisioning capability offers the flexibility to make better use of storage space. Organizations interviewed said that their storage administrators can manage the increase in volume of data at a lower cost through better use of disk space and reduced disruption. Organizations interviewed for this study said that as a result of the thin provisioning capabilities offered, they realized a 10% reduction in provisioning time. We also assume benefits are reduced by 25% in Year 1 to take into account the time it takes to fully implement the solution. Table 4 presents the calculation.

TABLE 4
Lower Provisioning Cost

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
C1	Number of workers		1	1	1
C2	Annual fully-loaded salary per worker		\$120,000	\$120,000	\$120,000
C3	Average time allocated to provisioning prior to deployment		50%	50%	50%
C4	Reduction in provisioning time after deployment		22%	22%	22%
Ct	Lower provisioning cost by having preinstalled software		\$13,200	\$13,200	\$13,200
Ctr	Risk adjustment		↓ 2%		
CT			\$9,702	\$12,936	\$12,936

Source: Forrester Research, Inc.

★ Improved speed

Improved speed boosts the ability to access information and ultimately support end user activity. Surveyed customers said that after implementation of IBM Storwize V7000, they were able to make new storage capacity available 26% faster than with the prior environment. The organization interviewed was only tracking the improvement in IT resources' effort to make storage available faster, and that is what we are calculating here. However, we believe that in addition to this benefit, there is a user benefit that is not currently being tracked, which is users' ability to access data faster to make better business decisions.

TABLE 5
Improved Speed

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
D1	Number of people		3	3	3
D2	Average time spent (hours)		25	25	25
D3	Average fully loaded hourly rate		\$58	\$58	\$58
D4	Improvement in percentage of time to get new storage capacity operational compared to previous environment		26%	26%	26%
D5	Improved speed to get new storage online		\$1,131	\$1,131	\$1,131
Dtr	Risk adjustment		↓ 2%		
DT			\$831	\$1,108	\$1,108

Source: Forrester Research, Inc.

★ Improved efficiency through compression

For several of the interviewed organizations that had purchased Storwize, one of the benefits was controlling the growth of storage costs within their environments by moving data away from the more costly production environments to less costly archived storage and servers, and by compressing archived data. One organization in particular noted that it had achieved storage cost savings of roughly 50% per year through using Real-time Compression, resulting in lower storage costs in production environments and reducing both the capital costs and support costs.

In order to construct the benefits for the composite organization, we assumed that it had a total production storage environment of roughly 20 TB in Year 1, which increased to 70 TB by Year 3. Based on our interviews with surveyed organizations, the model assumed that the production storage data could be compressed by 65%.

TABLE 6

Improved Storage Efficiency

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
E1	Total storage environment (TB)		20	40	70
E2	Percentage by which primary storage compressed		65%	65%	65%
E3	Average cost per TB — primary storage		\$21,630	\$19,467	\$17,520
Etr	Improved capital cost through increased compression rates		\$281,190	\$506,142	\$797,174
Etr	Risk adjustment		↓ 2%		
Et			\$275,566	\$496,019	\$781,230

Source: Forrester Research, Inc.

★ Total benefits

Table 7 shows the total of all benefits across the five areas listed above, as well as present values (PVs) discounted at 10%. Over three years, the representative organization expects risk-adjusted total benefits to be a PV of \$1,581,288.

TABLE 7

Total Benefits (Risk-Adjusted)

Benefit	Initial	Year 1	Year 2	Year 3	Total	Present Value
Lower provisioning cost by having preinstalled software		19,404	25,872	25,872	71,148	58,460
Lower administration cost per TB of storage			106,502	121,716	228,218	179,465
Simplified application performance tuning		29,988	39,984	39,984	109,956	90,347
Improved speed to get new storage online		1,385	2,586	2,956	6,927	5,618
Improved capital cost through increased compression rates		275,566	496,019	781,230	1,552,816	1,247,398
Total benefits		\$326,343	\$670,963	\$971,758	\$1,969,065	\$1,581,288

Source: Forrester Research, Inc.

COSTS

This section describes and lists the costs related to planning, testing, and implementing IBM Storwize V7000 over the three-year period. Cost consumptions are based on detailed interviews with an organization using IBM Storwize V7000 and a survey completed with 10 existing IBM Storwize V7000 customers. All costs are based on list prices and standard vendor discounts. These costs do not include any negotiated discounts. The following cost model for the composite organization serves as a framework for other organizations.

These costs represent the mix of internal and external costs experienced by the representative organization for initial planning, implementation, and ongoing maintenance associated with the solution.

💰 Hardware costs

This section includes hardware costs and related maintenance costs for the Storwize V7000 storage system. Readers should note that IBM has a three-year warranty on hardware and that the level of service can be upgraded during the warranty period. The cost of hardware includes the cost of additional drives purchased (\$1,599 per drive), the number of control enclosures (\$25,000 per enclosure), and the number of expansion enclosures (\$6,000 per enclosure). The hardware maintenance costs for a three-year agreement is 20% of the second- and third-year hardware costs. Table 8 illustrates the calculation.

TABLE 8
Hardware Costs — V7000

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
F1	Number of drives including RAID, spares			15	29	50
F2	Number of control enclosures			1	1	1
	Number of expansion enclosures			0	1	2
	Cost per drive		\$1,599			
	Cost per control enclosure		\$25,000			
	Cost per expansion enclosure		\$6,000			
F3	Hardware maintenance costs (three-year agreement)				20%	20%
	Total hardware costs			(\$48,985)	(\$92,845)	(\$140,340)
Fr	Risk adjustment		↑ 5%			
Ft	Total hardware costs (risk adjusted)			(\$49,475)	(\$93,774)	(\$141,743)

Source: Forrester Research, Inc.

💰 Software cost

Another cost component is software licensing and maintenance costs. The cost of the software includes the cost of base software as well as RTC costs. The list price for each component is \$18,000. The maintenance cost starts in Year 2 and equates to 20% of the software license list price. Table 9 illustrates the calculation.

TABLE 9
Software Costs — Real-Time Compression

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
D1	Base software			18,000	36,000	54,000
D2	RTC costs			9,000	18,000	27,000
	Annual maintenance (20%)				10,800	16,200
Dt	Total software cost			\$27,000	\$64,800	\$97,200
	Risk adjustment		↑ 5%			
Drt	Total software costs (risk adjusted)			(\$24,300)	(\$58,320)	(\$87,480)

Source: Forrester Research, Inc.

Implementation and administration costs

The next cost component is internal implementation costs. This cost describes the internal resources required to plan and implement IBM Storwize V7000. During this phase, the organization used the equivalent of three full-time resources during two months for planning, testing, and implementation. The organization interviewed also used third-party resources to support implementation. For the composite organization, we estimate a third-party cost of about \$20,000. This category represents 32% of the overall investment.

The final component of cost is ongoing management costs. This category represents 36% of the overall investment. Based on in-depth interviews with an organization using IBM Storwize V7000, Forrester estimates that three IT staff members (one each from the infrastructure team and support, and an IT manager) allocate 25% of their time to ongoing management of the IBM Storwize V7000 system.

TABLE 10
Implementation Cost

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
F1	Number of people		3		
F2	Number of months spent on discovery, analysis, and deployment		4.0		
F3	Average fully loaded monthly salary		\$10,000		
Ftr	Third-party costs		\$60,000		
	Internal implementation costs	$A1 * A2 * A3 + A4$	\$180,000		

Source: Forrester Research, Inc.

TABLE 11
Administration Cost

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
F1	Number of people		3		
F2	Average fully loaded salary		\$120,000		
F3	Percent of time allocated		25%		
Ftr	Administrative costs	$A1 * A2 * A3$	\$90,000	\$90,000	\$90,000

Source: Forrester Research, Inc.

Total costs

Table 13 shows the total of all costs as well as associated present values, discounted at 10%. Over three years, the representative organization expects total costs to total a net present value of a little more than \$751,285.

TABLE 13
Total Costs (Risk-Adjusted)

Benefit	Initial	Year 1	Year 2	Year 3	Total	Present value
Hardware costs		(48,985)	(77,371)	(116,950)	(55,247)	(55,247)
Real-time compression costs		(27,000)	(64,800)	(97,200)	(189,000)	(151,127)
Internal implementation costs	(180,000)				(180,000)	(180,000)
Administrative costs		(90,000)	(90,000)	(90,000)	(270,000)	(223,817)
Total	(\$180,000)	(\$165,985)	(\$232,171)	(\$304,150)	(\$882,306)	(\$751,285)

Source: Forrester Research, Inc.

FLEXIBILITY

Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could be turned into a business benefit for some future additional investment. This investment provides an organization with the “right” or the ability to engage in future initiatives, but not the obligation to do so. There are multiple scenarios in which a customer might choose to implement Storwize V7000 with Real-time Compression and later realize additional uses and business opportunities. Flexibility would also be quantified when evaluated as part of a specific project (described in more detail in Appendix [B]).

RISKS

Forrester defines two types of risk associated with this analysis: “implementation risk” and “impact risk.” “Implementation risk” is the risk that a proposed investment in Storwize V7000 with Real-time Compression may deviate from the original or expected requirements, resulting in higher costs than anticipated. “Impact risk” refers to the risk that the business or technology needs of the organization may not be met by the investment in Storwize V7000 with Real-time Compression, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for cost and benefit estimates.

Quantitatively capturing investment risk and impact risk by directly adjusting the financial estimates’ results provides more meaningful and accurate estimates and a more precise projection of the ROI. In general, risks affect costs by raising the original estimates, and they affect benefits by reducing the original estimates. The risk-adjusted numbers should be taken as realistic expectations since they represent the expected values considering risk.

The following impact risks that affect benefits are identified below:

- › The improvement in administrative effort could vary depending on the prior infrastructure and virtualization effort.
- › The amount of excess capacity reclaimed and the level of storage growth reduced could be lower than originally anticipated, leading to reduced storage cost savings.

The following implementation risks that affect costs are identified below:

- › The implementation costs could vary based on the internal skill sets and competencies.
- › The implementation costs could take longer than anticipated due to lack of planning and solution testing.

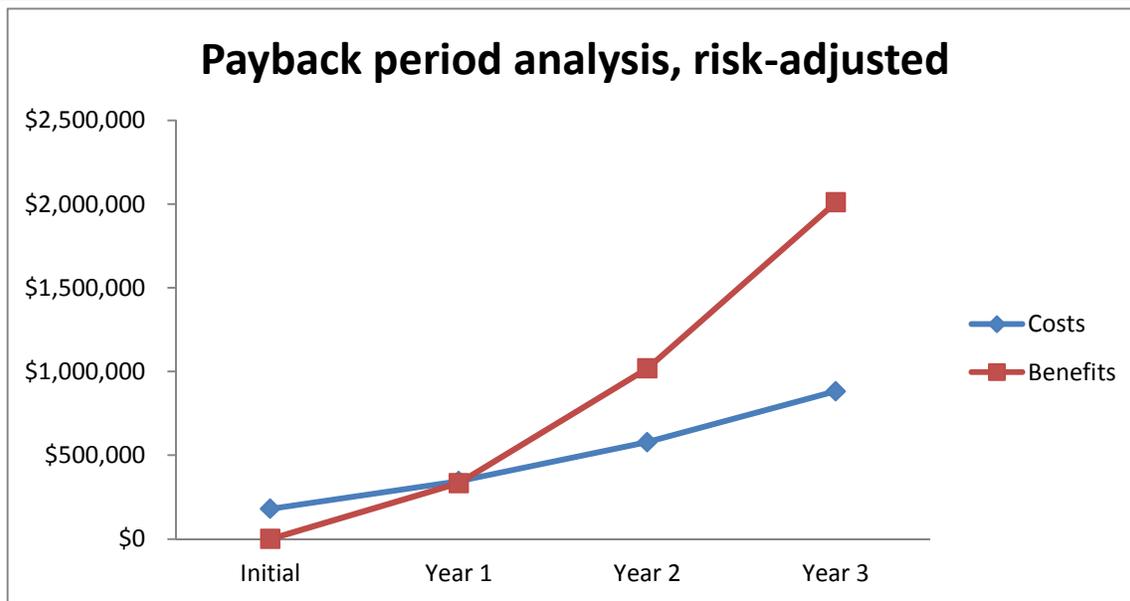
Financial Summary

The financial results calculated in the Benefits and Costs sections can be used to determine the ROI, NPV, and payback period for the organization's investment in Storwize V7000 with Real-time Compression.

Table 14 below shows the risk-adjusted ROI, NPV, and payback period values. These values are determined by applying the risk-adjustment values from Table [x] in the Risk section to the unadjusted results in each relevant Benefits and Costs section.

FIGURE 3

Cash Flow Chart (Risk-Adjusted)



Source: Forrester Research, Inc.

TABLE 14

Cash Flow: Risk-Adjusted

	Initial	Year 1	Year 2	Year 3	Total	Present value
Costs	(\$181,800)	(\$164,675)	(\$227,365)	(\$296,500)	(\$870,339)	(\$742,174)
Benefits		\$326,344	\$670,963	\$971,758	\$1,969,064	\$1,581,287
Net benefits	(\$181,800)	\$161,669	\$443,598	\$675,258	\$1,098,725	\$839,113
ROI	113%					
Payback period	14 months					

Source: Forrester Research, Inc.

IBM Storwize V7000 With Real-Time Compression: Overview

According to IBM,

Storwize V7000 is a powerful midrange block storage system that combines hardware and software components to provide a single point of control to help support improved storage efficiency. It is designed to improve application availability and resource utilization by enabling virtualization, consolidation and tiering in businesses of all sizes. The system offers easy-to-use, efficient and cost-effective management capabilities for both new and existing storage resources in an IT infrastructure.

Storwize V7000 combines a variety of IBM technologies including thin provisioning, automated tiering, storage virtualization, Real-time Compression, clustering, replication, multi-protocol support and a sophisticated graphical user interface (GUI). It also includes leading third-party technologies, such as Bridgeworks SANSlide network optimization. Together, these technologies are designed to enable Storwize V7000 to deliver high levels of storage efficiency.

Real-time Compression is designed to enable storing up to five times² as much data in the same physical disk space by compressing data as much as 80 percent. Unlike other approaches to compression, Real-time Compression is designed to be used with active primary data such as production databases and email systems, which dramatically expands the range of candidate data that can benefit from compression. Real-time Compression operates immediately as data is written to disk, meaning that no space is wasted storing uncompressed data awaiting post-processing.

The benefits of using Real-time Compression together with other efficiency technologies are very significant and include reduced acquisition cost (because less hardware is required), reduced rack space, and lower power and cooling costs throughout the lifetime of the system. When combined with external storage virtualization, Real-time Compression can significantly enhance the usable capacity of existing storage systems, extending their useful life even further.

Appendix A: Representative Organization Description

For this TEI study, based on in-depth interviews with an existing customer provided by IBM and surveys from 10 other customers using IBM Storwize V7000, Forrester constructed a TEI framework, a composite company, and an associated ROI analysis that illustrates the areas financially affected. The composite organization that Forrester synthesized from these results represents a midsized organization that is managing about 45 terabytes of data. The organization deployed IBM Storwize V7000 to better manage its growing storage needs.

In purchasing IBM Storwize V7000, the composite company had the following objectives:

- › Meet storage growth demand without continuously adding more disk space.
- › Improve access to data and improve application performance.
- › Reduce ongoing administrative effort to monitor storage.
- › Have the ability to make new storage available faster.

For the purpose of the analysis, Forrester assumes that the composite organization has 1,000 end users. The composite organization included three IT department members (one person from the infrastructure team, one tasked with storage administration, and one IT manager) in the implementation.

FRAMEWORK ASSUMPTIONS

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

The discount rate used in the PV and NPV calculations is [x%] and the time horizon used for the financial modeling is [x] years. Organizations typically use discount rates between 8% and 16% based on their current environments. Readers are urged to consult with their respective company's finance department to determine the most appropriate discount rate to use within their own organizations.

TABLE X

Model Assumptions

Ref.	Metric	Calculation	Value
C1	Hours per week		40
C2	Weeks per year		52
C3	Hours per year (M-F, 9-5)		2,080
C4	Hours per year (24x7)		8,736
C5	[insert job]		\$100,000
C6	Hourly	(C5/C3)	\$48

Source: Forrester Research, Inc.

Appendix B: Total Economic Impact™ Overview

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

The TEI methodology consists of four components to evaluate investment value: benefits, costs, flexibility, and risks.

BENEFITS

Benefits represent the value delivered to the user organization — IT and/or business units — by the proposed product or project. Often, product or project justification exercises focus just on IT cost and cost reduction, leaving little room to analyze the effect of the technology on the entire organization. The TEI methodology and the resulting financial model place equal weight on the measure of benefits and the measure of costs, allowing for a full examination of the effect of the technology on the entire organization. Calculation of benefit estimates involves a clear dialogue with the user organization to understand the specific value that is created. In addition, Forrester also requires that there be a clear line of accountability established between the measurement and justification of benefit estimates after the project has been completed. This ensures that benefit estimates tie back directly to the bottom line.

COSTS

Costs represent the investment necessary to capture the value, or benefits, of the proposed project. IT or the business units may incur costs in the form of fully burdened labor, subcontractors, or materials. Costs consider all the investments and expenses necessary to deliver the proposed value. In addition, the cost category within TEI captures any incremental costs over the existing environment for ongoing costs associated with the solution. All costs must be tied to the benefits that are created.

FLEXIBILITY

Within the TEI methodology, direct benefits represent one part of the investment value. While direct benefits can typically be the primary way to justify a project, Forrester believes that organizations should be able to measure the strategic value of an investment. Flexibility represents the value that can be obtained for some future additional investment building on top of the initial investment already made. For instance, an investment in an enterprisewide upgrade of an office productivity suite can potentially increase standardization (to increase efficiency) and reduce licensing costs. However, an embedded collaboration feature may translate to greater worker productivity if activated. The collaboration can only be used with additional investment in training at some future point. However, having the ability to capture that benefit has a PV that can be estimated. The flexibility component of TEI captures that value.

RISKS

Risks measure the uncertainty of benefit and cost estimates contained within the investment. Uncertainty is measured in two ways: 1) the likelihood that the cost and benefit estimates will meet the original projections, and 2) the likelihood that the estimates will be measured and tracked over time. TEI applies a probability density function known as "triangular distribution" to the values entered. At a minimum, three values are calculated to estimate the underlying range around each cost and benefit.

Appendix C: Glossary

Discount rate: The interest rate used in cash flow analysis to take into account the time value of money. Companies set their own discount rates based on their business and investment environments. Forrester assumes a yearly discount rate of 10% for this analysis. Organizations typically use discount rates between 8% and 16% based on their current environments. Readers are urged to consult their respective organizations to determine the most appropriate discount rate to use in their own environments.

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

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

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

Return on investment (ROI): A measure of a project's expected return in percentage terms. ROI is calculated by dividing net benefits (benefits minus costs) by costs.

A NOTE ON CASH FLOW TABLES

The following is a note on the cash flow tables used in this study (see the example table below). The initial investment column contains costs incurred at "time 0" or at the beginning of Year 1. Those costs are not discounted. All other cash flows in years 1 through 3 are discounted using the discount rate (shown in Framework Assumptions section) at the end of the year. PV calculations are calculated for each total cost and benefit estimate. NPV calculations are not calculated until the summary tables are the sum of the initial investment and the discounted cash flows in each year.

TABLE [EXAMPLE]

Example Table

Ref.	Metric	Calculation	Year 1	Year 2	Year 3

Source: Forrester Research, Inc.

Appendix D: Endnotes

¹ Forrester risk-adjusts the summary financial metrics to take into account the potential uncertainty of the cost and benefit estimates. For more information, see the section on Risk.