

A Forrester Total Economic Impact™ Study Prepared For IBM

The Total Economic Impact Of IBM's Real-Time Compression Solution

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Executive Summary

Despite the economic slowdown, storage capacity has been continuing to grow at a fast pace for the past few years. Although the portion of the overall IT budget allocated to storage is growing for many organizations, the amount of increased budget is likely not enough to fully accommodate the increased quantity of data with existing levels of efficiency. Business growth, the rollout of new products and services, the digitization of content, the rapid growth of unstructured data, the expanded use of rich digital content, and acquisitions all contribute to the increasing storage demand within a network attached storage (NAS) environment. Organizations will need to keep a close eye on containing the storage footprint through measures like compression while accommodating data growth of all kinds.¹

In October 2010, IBM commissioned Forrester Consulting to examine the total economic impact and potential return on investment (ROI) enterprises may realize by deploying IBM's Real-time Compression solution. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of IBM's Real-time Compression solution on their organizations.

IBM Real-time Compression provides online storage optimization through real-time data compression, which is transparent to the end users and has no impact on performance. For a more detailed overview about the IBM solution, please refer to page 19.

IBM's Real-Time Compression Solution Reduces Storage Utilization And Costs While Maintaining Storage Performance

Our interviews with four existing IBM customers and subsequent financial analysis found that a composite organization based on these companies we interviewed experienced the risk-adjusted ROI, costs, and benefits shown in Table 1. See Appendix A for a description of the composite organization.

Table 1

Composite Organization Three-Year Risk-Adjusted ROI²

ROI	Payback period	Total benefits (PV)	Total costs (PV)	Net present value
83%	Within 12 months	\$669,395	(\$366,108)	\$303,287

Source: Forrester Research, Inc.

- Benefits.** The composite organization (see Appendix A) we used for this analysis is a combination of the multiple interviews we conducted to delve deeper into the operational impact of IBM's Real-time Compression solution. This organization, which represents a manufacturer of high-tech products with 120 TB of primary storage and an annual storage growth rate of 30%, realized the following benefits that represent those experienced by the interviewed companies:

- **Reduced storage capacity requirement in the present environment.** With the deployment of IBM's Real-time Compression appliances the existing data residing on the primary storage within the main datacenter and the disaster recovery site gets compressed in a transparent way. The composite organization achieved an average compression rate of 63.5% and thus freed-up about 19 TB. The company was able to use this capacity for other applications and defer the investment in new storage capacity. This benefit has a three-year risk-adjusted value of \$481,893.
- **Reduced storage capacity requirement in the future.** Compressing the data on the primary storage in real-time also slows down the need for new storage capacity. The composite organization was able to reduce the annual storage growth rate by 35% and thus the overall cost of storage altogether. This resulted in cost savings that have a three-year risk-adjusted value of \$172,966.
- **Storage management and administration cost savings.** Reducing the overall storage footprint also results in operational efficiencies. There is less data to manage, administer, back up, and archive. The composite organization was able to reassign the equivalent of a half-time resource to other tasks. This benefit has a three-year risk-adjusted value of about \$117,500.
- **Reduced tier 2 storage footprint.** Compressing the primary data at its source also reduces the required storage capacity for backups and archives. While this benefit represents additional cost savings for many companies, this benefit has not been quantified in this study. Real Time Compression can provide additional savings for their backup and archiving environment, that level may vary depending on the size of the tier 2 storage environment.
- **Costs.** The composite organization experienced the following costs for the deployment and the use of IBM's Real-time Compression appliances over a period of three years:
 - **Technology costs.** The technology costs include the expenses for the four IBM appliances, the associated software, and maintenance fees. These costs have a three-year risk-adjusted value of \$307,667.
 - **Administrative costs.** For the administration of the new real-time compression solution, this analysis assumes a workload of about 5 hours per week. This represents a three-year risk-adjusted value of \$42,900.
 - **Professional service costs.** Professional service costs for assistance with the integration of the new solution have a three-year risk-adjusted value of \$15,000.
 - **Internal implementation costs.** The internal labor costs for the planning, integration, and compression of the existing data have a three-year risk-adjusted value of \$15,392.
 - **Training costs.** Initial training costs have a three-year risk-adjusted value of \$8,000.

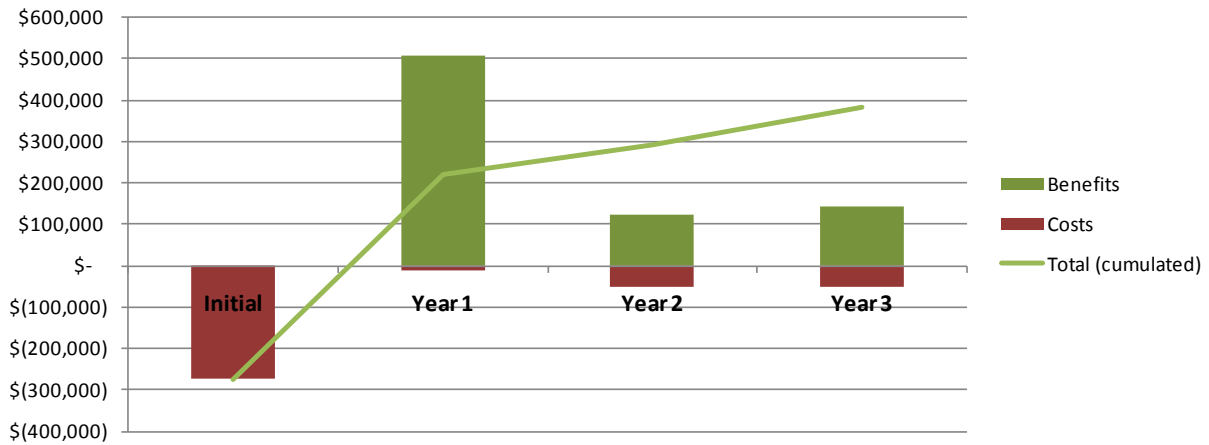
In addition to the quantified benefits described above, the composite organization also realized other non-quantifiable benefits including:

- **Keeping more data online.** Companies often use the freed storage space to keep more data online. While this additional data may enable deeper analysis and may lead to better decision-making, the financial impact of such a decision is too variable to be included in this business case.
- **Shorter response times.** Due to the caching mechanisms of the real-time compression appliances, companies might experience improved response times for some applications. While this effect can be observed by the IT department, the impact on the end users is hard to quantify and has therefore not been taken into account in this ROI calculation.

Figure 1 summarizes the yearly and cumulated cash flow and Figure 2 shows the breakdown of the benefit and cost categories for the composite organization.

Figure 1

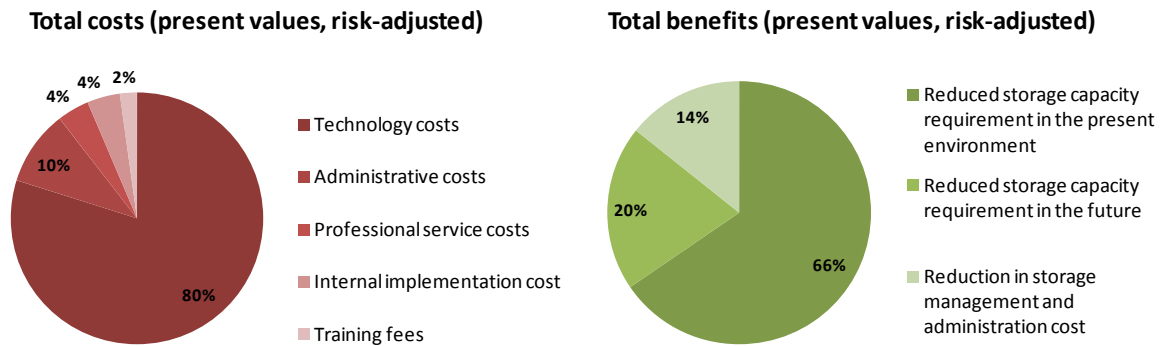
Summary Financial Results (Risk-Adjusted)



Source: Forrester Research, Inc.

Figure 2

Breakdown Of Total Costs And Benefits (Three-Year Present Value [PV], Risk-Adjusted)



Source: Forrester Research, Inc.

Factors Affecting Benefits And Costs

Table 1 illustrates the risk-adjusted financial results that were achieved by the composite organization. The risk-adjusted values take into account any potential uncertainty or variance that exists in estimating the costs and benefits, which produces more conservative estimates. The following factors may affect the financial results that an organization may experience:

- Amount of primary storage.** The amount of data that an organization keeps on primary storage depends on a lot of factors including the size of the company, the nature of its business, operational and organizational structures, and regulatory requirements. The bigger the primary storage footprint of the company, the higher the realizable benefits.
- Type of data.** Real-time compression only has an impact on file data. Additionally, the type of data that an organization keeps on primary storage determines the achievable average data compression rate. Database, VMware, back-office, computer-aided design/computer-aided manufacturing (CAD/CAM), software development, and preproduction rich media files all have average compression rates of more than 60%.
- Cost of primary storage.** The main benefit of the real-time compression solution is to save storage capacity. The benefit calculations are based on the fully loaded cost of primary storage, which includes not only the storage hardware costs but also costs for the related network equipments, storage software, and datacenter infrastructure. The value of the benefit thus varies with this fully loaded cost.

Disclosures

The reader should be aware of the following:

- The study is commissioned by IBM and delivered by the Forrester Consulting group.
- Forrester makes no assumptions as to the potential return on investment that other organizations will receive. Forrester strongly advises that readers should use their own estimates within the framework provided in the report to determine the appropriateness of an investment in IBM's Real-time Compression solution.
- 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.

TEI Framework And Methodology

Introduction

From the information provided in the interviews, Forrester has constructed a Total Economic Impact™ framework for those organizations considering implementing IBM's Real-time Compression solution. 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's Real-time Compression solution can have on an organization (see Figure 3). Specifically, we:

- Interviewed IBM marketing and sales personnel and Forrester analysts to gather data relative to IBM's Real-time Compression solution and the marketplace for real-time compression.
- Interviewed four organizations currently using IBM's Real-time Compression solution to obtain data with respect to costs, benefits, and risks.
- Designed a composite 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 composite organization.

Figure 3

TEI Approach



Source: Forrester Research, Inc.

Forrester employed four fundamental elements of TEI in modeling IBM's Real-time Compression solution:

1. Costs.
2. Benefits to the entire organization.
3. Flexibility.
4. Risk.

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

Analysis

Interview Highlights

A total of four interviews were conducted for this study, involving representatives from the following IBM customers:

1. A large production company of films, video games, and television programs based in the US.
2. An Israeli subsidiary of a large, US-based enterprise producing and selling unified communications and collaboration solutions.
3. A visual effects and animation studio based in Israel.
4. A large producer of intelligent semiconductor solutions based in the US.

The four in-depth interviews uncovered cases where the interviewed organizations were able to use existing storage assets more efficiently, to reduce the pace of storage growth and to create operational efficiencies, without any impact on performance.

In particular, the interviewed organizations shared a set of common challenges that drove the calculations of benefits for the composite organization:

- **Rapid growth of storage.** All organizations noted that demand for an increasing amount of storage resources had been a primary driver in making the move toward real-time compression. Before the introduction of the IBM appliances, the interviewed companies were managing between 5 TB to 120 TB of primary storage and reported average annual storage growth rates from 20% to more than 50%.
- **High demand on performance.** All interviewed organizations had considered several alternative compression solutions but had chosen the IBM solution because of the good performance. In particular, the organizations reported that the IBM Real-time Compression solution had no impact on performance. They indicated that the IBM solution is completely transparent to the end users who do not even realize that the data that they access is compressed.
- **Importance of a highly available and secure storage environment.** Several of the interviewed organizations have deployed the IBM Real-time Compression appliances in a high-availability pair in the primary and the disaster recovery data center.

Due to the deployment of IBM's solution, the interviewed organizations managed to decrease their company's storage footprint and to slow down the growth in storage. The interviewees reported average compression rates between 60% and 75% and a decrease of their annual storage growth rate by 30% to 40%. This has a positive impact on the capital expenditure side but also creates operational efficiencies as less storage capacity has to be managed, administered, backed up, and archived.

Finally, the interviewed organizations told us about the lightweight ease of installation and administration of the new solution. The actual installation of the appliances usually took only a few hours. The initial compression of the existing online data took from a few days to two weeks but was carried out in the background and did not affect the end users.

Composite Organization

Based on the interviews with the four existing customers provided by IBM, Forrester constructed a TEI framework, a composite company, and an associated ROI analysis that illustrates the areas financially affected.

The composite organization in this study represents a large high-tech manufacturing company based in the US. The company employs about 1,500 people. The company uses a cluster of network attached storage for its production and R&D division. The data, which consists mainly of R&D files and records of the virtual environment, can be shared among multiple users in a distributed network. This cluster is replicated on the disaster recovery site. The company needs to keep the data from multiple versions of its products, and the primary storage grows on average at 30% on an annual basis. All the data is backed up on a daily basis and then archived on tapes.

Before the deployment of IBM real-time compression, the composite organization was using 90% of its 120 TB of primary storage. Due to the introduction of a new product, more free storage capacity was required, and the company was looking for a reliable but cost-effective way to increase the storage capacity.

The main business objectives for the investment in the IBM real-time compression solution were to:

- Delay investment in additional storage hardware.
- Implement a compression solution that is completely transparent to the end users and does not affect performance.
- Realize immediate gain in storage capacity.
- Reduce the cost of storage.

Framework Assumptions

Table 2 provides the model assumptions that Forrester used in this analysis.

Table 2

Model Assumptions

Ref.	Metric	Calculation	Value
A1	Total amount of primary storage (in TB)		120 TB
A2	% of primary storage data that uses NAS protocols		25%
A3	Total amount of primary storage under control of real-time compression (in TB)	$A1 * A2$	30 TB
A4	Projected average annual storage growth rate		30%
A5	Average fully loaded annual salary rate ³		\$120,000

Source: Forrester Research, Inc.

To calculate the financial impact of a reduced storage footprint and a decreased storage growth rate, we first need to make assumptions around the fully loaded cost of primary storage. Organizations have to take into account not only the cost of the actual disks but also the proportions of all surrounding costs, such as the costs for the related network equipment, storage software, associated infrastructure within the datacenters, and staffing costs. This analysis also assumes a reduction of the storage and related network hardware costs over the time of the analysis.

Table 3 illustrates the breakdown of the projected fully loaded annual cost of primary storage per TB over a three-year period. As this analysis examines the impact of IBM's solution on operations separately, row B9 indicates the fully loaded cost of primary storage per TB per year excluding any staffing costs.

Table 3

Primary Storage Cost Assumptions Per TB Per Year

Ref.	Type	% of fully loaded costs (Year 1)	Assumed annual cost reduction	Year 1	Year 2	Year 3
B1	Hardware: disks, shelves, etc.	30%	10%	\$10,500	\$9,450	\$8,505
B2	Hardware: networking (cables, routers, etc.)	15%	10%	\$5,250	\$4,725	\$4,253
B3	Software (for storage)	14%	0%	\$4,900	\$4,900	\$4,900
B4	Infrastructure: telecom	8%	0%	\$2,800	\$2,800	\$2,800
B5	Infrastructure: power	5%	0%	\$1,750	\$1,750	\$1,750
B6	Infrastructure: floor space	3%	0%	\$1,050	\$1,050	\$1,050
B7	Staffing (for storage)	25%	0%	\$8,750	\$8,750	\$8,750
B8	Fully loaded primary storage cost per TB per year (including staffing costs)	Sum (B1:B7)		\$35,000	\$33,425	\$32,008
B9	Fully loaded primary storage cost per TB per year (excluding staffing costs)	B8 - B7		\$26,250	\$24,675	\$23,258

Source: Forrester Research, Inc.

The discount rate used in the present value (PV) and net present value (NPV) calculations is 10% and the time horizon used for the financial modeling is three years. Organizations typically use discount rates between 8% and 16% based on their current environment. Readers are urged to consult with their respective company's finance department to determine the most appropriate discount rate to use within their own organizations.

Costs

This section describes and lists the incremental costs incurred by the composite organization for deploying and using IBM's Real-time Compression solution over a three-year period.

Technology Costs

The composite organization had to invest in four IBM Real-time Compression Appliances (STN6500). These appliances are deployed as two high-availability pairs in the primary datacenter and on the disaster recovery site. The initial investment of \$230,000 includes the hardware costs, related software licenses, and maintenance fees for the first year. For the following years, the composite organization pays an annual maintenance fee of \$36,000.

Please note that we used IBM list prices in this analysis. Readers should ask for a quote to determine what hardware, software and maintenance costs would be applicable for their particular environments.

Internal Implementation Costs

The internal labor costs for planning, implementation, and project management are indicated in row C2 of Table 4 below. For the composite organization, we assumed three people working for about 80 hours at a fully burdened hourly cost of \$60.

Professional Service Costs

The composite organization paid \$15,000 for professional services from IBM to assist them with the deployment and the initial data compression.

Training Fees

In this analysis, we assume that two people from the storage team attend a training course. The total training costs of \$8,000 are indicated in row C5 in Table 4 below.

Administrative Costs

Ongoing administrative costs include the labor necessary to support and manage the real-time compression solution on a daily basis. For the purpose of this analysis, the composite organization will allocate one staff member on average 5 hours per week to support and manage the new appliances. Assuming a fully burdened cost of \$60 per hour, we can calculate that the total yearly cost of administration and support equates to \$42,900. To take into account the ramp-up phase, only 75% of these costs are included in Year 1.

Total Costs

Table 4 summarizes the incremental costs incurred by the composite organization for deploying and using IBM's Real-time Compression solution over a three-year period. In total, the composite organization spent \$382,300 over three years.

Table 4

Total Costs (Non-Risk-Adjusted)

Ref.	Costs	Initial	Year 1	Year 2	Year 3	Total
C1	Technology costs (initial)	(230,000)				(230,000)
C2	Technology costs (recurring)			(36,000)	(36,000)	(72,000)
C3	Internal implementation costs	(14,400)				(14,400)
C4	Professional service costs	(15,000)				(15,000)
C5	Training fees	(8,000)				(8,000)
C6	Administrative costs		(11,700)	(15,600)	(15,600)	(42,900)
C7	Total	(\$267,400)	(\$11,700)	(\$51,600)	(\$51,600)	(\$382,300)

Source: Forrester Research, Inc.

Benefits

The IBM customers we interviewed for this study described a range of hard benefits that they have accrued from their deployment of the Real-time Compression solution. The benefits they described to Forrester involved reduced storage capacity requirements and operational cost savings.

Each of these categories of benefit is discussed below.

Reduced Storage Capacity Requirement In The Present Environment

With the introduction of IBM's Real-time Compression appliances, the composite organization proceeded with the compression of the existing in-production and replicated primary storage. While different types of data such as database files, back-office data, or rich media files obtain different compression rates, the organization achieved an average compression rate of 63.5%. The company thus freed-up 19.05 TB and avoided the investment in additional capacity that its R&D division requested for the introduction of a new product. Considering the fully loaded costs of primary storage (excluding staffing costs) indicated in Table 3, this benefit has a value of \$500,063 (see Table 5).

Table 5

Reduced Storage Capacity Requirement In The Present Environment

Ref	Metric	Calculation	Year 1	Year 2	Year 3	Total
D1	Existing baseline primary storage under control of real-time compression (in TB)	See A3	30 TB			
D2	% of baseline storage used by database		70%			

Ref	Metric	Calculation	Year 1	Year 2	Year 3	Total
D3	% of baseline storage used by back-office data		20%			
D4	% of baseline storage used by rich media files		10%			
D5	Estimated average compression rate for database files		65%			
D6	Estimated average compression rate for back-office files		60%			
D7	Estimated average compression rate for rich media files		60%			
D8	Average compression rate	$(D2*D5) + (D3*D6) + (D4*D7)$	63.50%			
D9	Number of TB freed up	$D1*D8$	19.05 TB			
D10	Cost per TB per year	See B9	\$26,250			
D11	Reduced storage capacity requirement in the present environment	$D9*D10$	\$500,063	\$0	\$0	\$500,063

Source: Forrester Research, Inc.

Reduced Storage Capacity Requirement In The Future

The composite organization managed to not only reduce the initial storage footprint but also slowed down future growth by 35%. The company thus limits the investment in extra capacity in the years to come. In Years 2 and 3, the organization avoided purchasing 3.15 TB and 4.1 TB, respectively. Taking into account the fully loaded cost of primary storage indicated in Table 3, this benefit has a value of \$172,966.

Table 6

Reduced Storage Capacity Requirement In The Future

Ref	Metric	Value/calc.	Year 1	Year 2	Year 3	Total
E1	Projected annual storage growth	See A4		30%	30%	
E2	Initially projected primary storage capacity in TB		30 TB	39 TB	51 TB	
E3	Estimated reduction in growth due to compression			35%	35%	
E4	Amount of TB of primary storage avoided purchasing	$(E2[\text{Year } x] - E2[\text{Year } x-1])*E3$		3.15 TB	4.095 TB	

Ref	Metric	Value/calc.	Year 1	Year 2	Year 3	Total
E5	Cost per TB per year	See B9	\$26,250	\$24,675	\$23,258	
E6	Reduced storage capacity requirement in the future	E4*E5	\$0	\$77,726	\$95,239	\$172,966

Source: Forrester Research, Inc.

Storage Management And Administration Cost Savings

By reducing the actual and future primary storage footprint, the composite organization also realizes operational efficiencies within the storage team. This results in less primary storage capacity to administer and manage as well as less data to back up and archive. Based on the findings of the interviewed organizations, the composite organization had a staff of three full-time employees (FTEs) at a fully burdened salary rate of \$120,000. By reducing the storage footprint, the organization was able to reassign the equivalent of a half-time resource to other tasks. This corresponds to a reduction of 17%. To take into account the ramp-up period, only 50% of the benefit was considered in Year 1. Table 7 illustrates the calculation used.

Table 7
Storage Management And Administration Cost Savings

Ref	Metric	Value/calc.	Year 1	Year 2	Year 3	Total
F1	Number of FTEs in the storage team before the introduction of IBM's Real-time Compression solution	3				
F2	Number of FTEs that were reassigned to other tasks	0.5				
F3	% of reduction	17% = F2/F1				
F4	Average fully loaded annual salary rate (see A5)	\$120,000				
F5	% captured in Year 1 (ramp-up)	50%				
F6	Reduction in storage management and administration cost	F2*F4 (*F5 in Year 1)	\$30,000	\$60,000	\$60,000	\$150,000

Source: Forrester Research, Inc.

Total Benefits

Table 8 shows the total benefits for the composite organization that were quantifiable for this study.

Table 8

Total Benefits (Non-Risk-Adjusted)

Ref	Metric	Year 1	Year 2	Year 3	Total
G1	Reduction in storage management and administration cost	30,000	60,000	60,000	150,000
G2	Reduced storage capacity requirement in the present environment	500,063			500,063
G3	Reduced storage capacity requirement in the future		77,726	95,239	172,965
G4	Total benefits	\$530,063	\$137,726	\$155,239	\$823,028

Source: Forrester Research, Inc.

Customers also cited shorter response times and better decision-making due to the availability of more historical data. While these benefit categories bear potential value, they are difficult to quantify and attribute to an investment in a real-time compression solution.

Forrester did not quantify the benefits of these latter categories nor the potential impact on tier 2 and beyond storage in this study because they are highly specific to each organization. Users of this case study are encouraged to include their own estimates as they replicate this financial framework to gauge the financial impact of an investment in IBM's Real-time Compression solution for their own organizations.

Flexibility

Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could be turned into business benefit for some future additional investment. This provides an organization with the "right" or the ability to engage in future initiatives but not the obligation to do so. There are multiple scenarios in which a customer might choose to implement IBM's Real-time Compression solution and later realize additional uses and business opportunities such as extending the use of compression technology apart from primary storage or having the flexibility in most cases to implement Real Time Compression regardless of underlying NAS solution.

While Forrester believes organizations can take advantage of these flexibility options, quantification (using the financial industry standard Black-Scholes or the binomial option pricing models) of the additional value associated with these options for this customer would require scenario development and forward-looking analysis, which is not available at this time.

The value of flexibility is unique to each organization, and the willingness to measure its value varies from company to company (see Appendix A for additional information regarding the flexibility calculation).

Risk

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 IBM’s Real-time Compression solution 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 IBM’s Real-time Compression solution, 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 and impact risk by directly adjusting the financial estimates results in more meaningful and accurate estimates and a more accurate projection of the ROI. In general, risks affect costs by raising the original estimates, and they affect benefits by reducing the original estimates. The risk-adjusted numbers should be taken as “realistic” expectations because they represent the expected values considering risk.

The following implementation risks are identified as part of the analysis:

- Planning, installation, and testing could demand more time than originally anticipated due to the organization’s prior experience with compression and de-duplication technology.
- Acquisition costs could be higher than originally anticipated for both the Real-time Compression hardware and software based on the level of discount price received from IBM.

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

- The amount of storage brought under control of Real-time Compression could be lower than originally anticipated due to a change in the types of files the organization would like to see compressed.
- Movement of storage administration staff could take longer than originally anticipated leading to reduced administration cost savings.
- 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.

Table 9 shows the values used to adjust for risk and uncertainty in the cost and benefit estimates. The TEI model uses a triangular distribution method to calculate risk-adjusted values. To construct the distribution, it is necessary to first estimate the low, most likely, and high values that could occur within the current environment. The risk-adjusted value is the mean of the distribution of those points. Readers are urged to apply their own risk ranges based on their own degree of confidence in the cost and benefit estimates.

Table 9

Cost And Benefit Risk Adjustments

Cost	Original estimate (PV)	Risk-adjusted estimate (PV)	Risk weight
Technology costs (initial)	(230,000)	(235,667)	102%
Technology costs (recurring)	(56,799)	(56,799)	100%
Implementation/planning costs	(14,400)	(15,392)	107%
Implementation costs	(15,000)	(15,000)	100%
Training fees	(8,000)	(8,000)	100%
Administrative costs	(35,249)	(35,249)	100%
Benefit	Original estimate (PV)	Risk-adjusted estimate (PV)	Risk weight
Reduction in storage management and administration costs	121,938	95,518	78%
Reduced storage capacity requirement in the present environment	454,602	438,085	96%
Reduced storage capacity requirement in the future	135,791	135,791	100%

Source: Forrester Research, Inc.

Readers are urged to apply their own risk ranges based on their own degree of confidence in the cost and benefit estimates.

Financial Summary

The financial results calculated in the Costs and Benefits sections can be used to determine the return on investment, net present value, and payback period for the organization's investment in IBM's Real-time Compression solution. These are shown in Table 10 below.

Table 10

Cash Flow — Non-Risk-Adjusted

Cash flow — original estimates						
	Initial	Year 1	Year 2	Year 3	Total	PV
Costs	(267,400)	(11,700)	(51,600)	(51,600)	(382,300)	(359,449)
Benefits		530,063	137,726	155,239	823,028	712,332
Total	(267,400)	518,363	86,126	103,639	440,728	352,883
ROI	98%					
Payback period	Within 12 months					

Source: Forrester Research, Inc.

Table 11 below shows the risk-adjusted ROI, NPV, and payback period values. These values are determined by applying the risk-adjustment values from Table 9 in the Risk section to the cost and benefits numbers in Tables 4 and 8.

Table 11

Cash Flow — Risk-Adjusted

Cash flow — risk-adjusted estimates						
	Initial	Year 1	Year 2	Year 3	Total	PV
Costs	\$(274,059)	\$(11,700)	\$(51,600)	\$(51,600)	\$(388,959)	\$(366,108)
Benefits		\$505,393	\$124,726	\$142,239	\$772,359	\$669,395
Total	\$(274,059)	\$493,693	\$73,126	\$90,639	\$383,400	\$303,287
ROI	83%					
Payback period	Within 12 months					

Source: Forrester Research, Inc.

IBM's Real-Time Compression Solution: Overview

According to IBM, IBM's Real-time Compression Appliances are the only storage compression solutions that can shrink primary, online data in real time, without performance degradation. By significantly reducing storage requirements, enterprises can keep up to five times* more information online for analytics, use the improved efficiency to reduce storage costs and utility cost (power, cooling and footprint) or achieve a combination of greater capacity and reduced cost. IBM Real-time Compression can deliver improved user response time and overall throughput, because compressing data prior to storing data makes the overall storage system much more efficient.

IBM Real-time Compression Appliances increase the capacity of the existing storage infrastructure to help companies meet the demands of rapid data growth while also enhancing storage performance and utilization. Additionally, IBM Real-time Compression Appliances allow customer to purchase up to five times* less storage on net new purchases as well. All IBM Real-time Compression Appliances apply IBM's patented real-time data compression techniques to primary and existing storage, delivering optimization and savings throughout the entire storage life cycle. The result is cost savings along with operational and environmental efficiencies.

IBM Real-time Compression's patented Random Access Compression Engine (RACE) technology is based on proven Lempel-Ziv (LZ) data compression algorithms. RACE enables IBM Real-time Compression Appliances to deliver real-time, random access, deterministic and lossless data compression, maintaining reliable and consistent performance and data integrity.

IBM Real-time Compression Appliances have redundant and hot-swap components, and are deployed in pairs for high availability environments. Enhanced monitoring capabilities enable greater visibility into high-availability IBM Real-time Compression environments.

Appendix A: Composite Organization Description

In this TEI study, Forrester has created a composite organization to illustrate the quantifiable costs and benefits, risk, and flexibility of deploying IBM's Real-time Compression solution. Forrester's conclusions were derived in large part from information received in a series of in-depth interviews with executives and personnel at four organizations currently using IBM's Real-time Compression solution. As each of the interviewed organizations was promised anonymity, Forrester constructed a composite company, a TEI framework, and an associated ROI analysis based on our findings from these IBM customers.

This study illustrates the financial impact of using IBM's Real-time Compression solution by aggregating the findings from the customer interviews and portraying a composite organization that is achieving value from IBM's solution.

The composite organization in this study represents a large high-tech manufacturing company based in the US. The company employs about 1,500 people. The company uses a cluster of network attached storage for its production and R&D division. The data, which consists mainly of R&D files and records of the virtual environment, can be shared among multiple users in a distributed network. This cluster is replicated on the disaster recovery site. The company needs to keep the data from multiple versions of its products and the primary storage grows on average at 30% on an annual basis. All the data is backed up on a daily basis and then archived on tapes.

Before the deployment of IBM Real-time Compression, the composite organization was using 90% of its 120 TB of primary storage. Due to the introduction of a new product, more free storage capacity was required, and the company was looking for a reliable but cost-effective way to increase the storage capacity.

The main business objectives for the investment in the IBM Real-time Compression solution were to:

- Delay investment in additional storage hardware.
- Realize immediate gain in storage capacity.
- Reduce the cost of storage.
- Implement a compression solution that is completely transparent to the end users and has no impact on performance.

With the introduction of IBM's Real-time Compression solution, the company achieved an overall average compression ratio of 63.5%.

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, risks, and flexibility.

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.

Risk

Risk measures 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 minimum, three values are calculated to estimate the underlying range around each cost and benefit.

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

Appendix C: Glossary

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

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

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

Payback period: The breakeven point for an investment. 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. Present value (PV) calculations are calculated for each total cost and benefit estimate. Net present value (NPV) calculations are not calculated until the summary tables and are the sum of the initial investment and the discounted cash flows in each year.

Table [Example]

Example Table

Ref.	Category	Calculation	Initial cost	Year 1	Year 2	Year 3	Total

Source: Forrester Research, Inc.

Appendix D: Related Forrester Research

“Controlling Storage Cost Amid High Growth,” Forrester Research, Inc., February 3, 2010

“How Efficient Is Your Storage Environment?,” Forrester Research, Inc., October 22, 2009

Appendix E: Endnotes

¹ See Forrester Report “Controlling Storage Cost Amid High Growth,” Forrester Research, Inc., February 3, 2010.

² Forrester risk-adjusts the summary financial metrics to take into account the potential uncertainty of the cost and benefit estimates. For more information on Risk, please see page 16.

³ The fully loaded annual salary rate includes the salary, variable compensation, and all direct benefits (e.g., health insurance).