A Forrester Total Economic Impact™ Study Prepared For IBM

The Total Economic Impact Of Migrating A Heterogeneous Database Environment To IBM DB2 For SAP And Non-SAP Environments

A Multicompany Analysis

Project Director: Jon Erickson

April 2011

FORRESTER

Headquarters | Forrester Research, Inc.
400 Technology Square, Cambridge, MA 02139 USA
Tel: +1 617.613.6000 | Fax: +1 617.613.5000 | www.forrester.com

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Executive Summary

In August 2010, IBM commissioned Forrester Consulting to examine the total economic impact and potential return on investment (ROI) that enterprises may realize by migrating their SAP and non-SAP application environments to IBM's DB2 database platform. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of IBM DB2 on their organizations. This study illustrates the financial impact of adopting IBM DB2 for both SAP and non-SAP applications based on aggregated findings of customers that migrated to DB2 from a variety of older legacy database platforms.

In conducting in-depth interviews with five global organizations using IBM DB2 both within SAP and non-SAP environments, Forrester found examples of how DB2 delivered key benefits both inside and outside of IT within three key benefit areas:

- Reduced cost of administration.
- Improved operational expenses.
- Reduced storage cost.

Key Findings

Forrester's study yielded three key findings:

- **ROI.** Based on the interviews with five existing DB2 customers described above, Forrester constructed a Total Economic Impact™ (TEI) framework (see Appendix A) and the associated ROI analysis illustrating the financial impact areas. As seen in Table 1, the ROI for our representative organization is 192%, with a breakeven point (payback period) of 12 months after deployment. The representative organization is a Europe-based financial services organization that migrated a portion of both its SAP and non-SAP application environments. For a more detailed description of the representative organization, please see Appendix B.

Table 1
Three-Year Risk-Adjusted ROI/TCO[1]

ROI	Payback period	Total benefits (PV)	Total costs (PV)	Net present value
192%	12 months	768,829	263,004	505,825

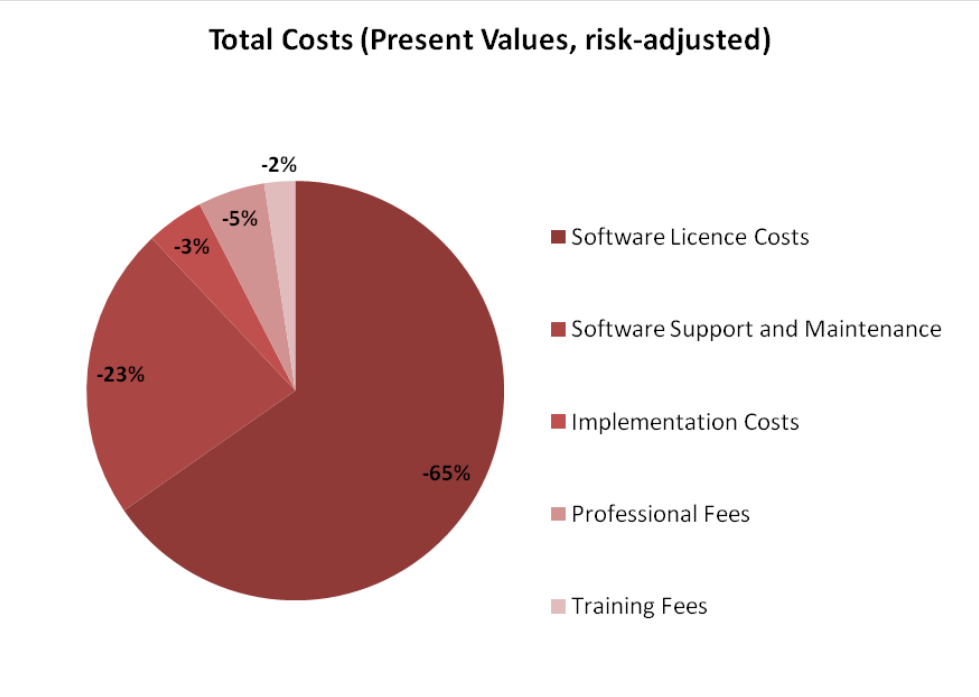
Source: Forrester Research, Inc.

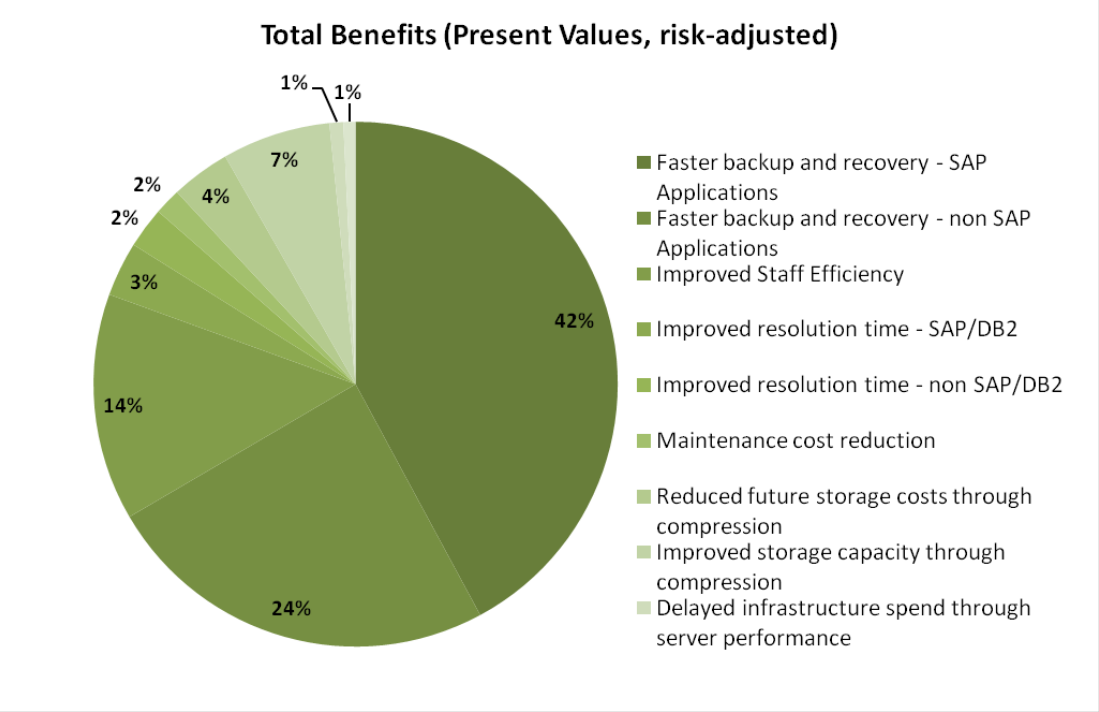
- **Benefits.** Incremental benefits resulting from the migration to DB2 included improvements in storage and administration, efficiency, lower operational and capital costs, and savings of reduced storage through compression.

- **Costs.** The incremental cost to migrate to the DB2 platform included the overall cost of license and annual maintenance, cost of upfront implementation and hardware, and the cost of ongoing support over a three-year time horizon.

Figure 1 illustrates the relative size of the different cost and benefit categories for the representative organization.

Figure 1
Total Cost/Benefit Breakdown (Present Values, Risk-Adjusted)





Source: Forrester Research, Inc.

Factors Affecting Benefits And Costs

Table 1 illustrates the risk-adjusted financial results that were achieved by the representative organization. The risk-adjusted value is meant to provide a conservative estimation, incorporating any potential risk factors that might later affect the original cost and benefit estimates. Although the total cost and benefit values will vary by organization, the ROI and payback period may represent an anticipated result for organizations considering a migration to DB2.

The following factors may affect the financial results that an organization may experience:

- Ability to find and train administrators.
- Size and complexity of deployment.
- Number and complexity of transactions.

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 ROI 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 DB2.
- 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

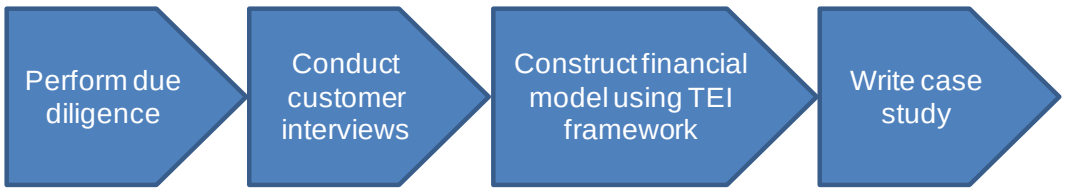
From the information provided in the interviews, Forrester has constructed a TEI framework for those organizations considering implementing IBM DB2. The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision.

Approach And Methodology

Forrester took a multistep approach to evaluate the impact that IBM DB2 can have on an organization (see Figure 2). Specifically, we:

- Interviewed IBM marketing/sales/consulting personnel and Forrester analysts to gather data relative to DB2 and the marketplace for DB2.
- Interviewed five organizations currently using IBM DB2 to obtain data with respect to costs, benefits, and risks.
- 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.

Figure 2
TEI Approach



Source: Forrester Research, Inc.

Forrester employed four fundamental elements of TEI in modeling IBM DB2's service:

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 A for additional information on the TEI methodology.

Analysis

Interview Highlights

A total of five interviews were conducted for this study, involving representatives from the following companies (IBM customers based in the US and Europe). As part of the analysis, Forrester agreed to customer anonymity, which is typical for this type of multicompany case study:

- A global consumer products company based in the US with approximately 23,000 employees.
- A Europe-based electric utility with roughly 6 million customers.
- A Latin American financial services provider with locations throughout South America.
- A Europe-based financial services organization.
- A Europe-based chemical manufacturer.

The five interviews uncovered several key themes that drove the creation of the financial analysis:

- While the interviewed organizations were using a variety of database platforms prior to the migration, the need to maintain or reduce the annual maintenance spend was a consideration in the overall business case to DB2. Most of the organizations had an enterprise agreement with IBM, and the shift to DB2 allowed them to achieve volume discounts through purchasing IBM solutions throughout the infrastructure stack.
- A key catalyst for many of the organizations was the need to upgrade their earlier database versions to current version databases. Many organizations had not upgraded their databases for several years, resulting in the need to take advantage of new features found within the current database platforms.
- The decision for organizations to migrate when they did depended on where they were in the refresh cycle with their existing legacy database, application, or infrastructure environment.
- Organizations that were using SAP and non-SAP applications saw positive economic gains from the movement to DB2. However, organizations who were leveraging DB2 in combination with their SAP application footprint noted the product integration between SAP and DB2 through initial configuration and application and database as well as integrated monitoring though dbacockpit.
- As part of the refresh, organizations repurposed their existing storage and server infrastructure for DB2, lowering the overall cost of migration.
- The majority of the organizations using SAP applications had performed the SAP Unicode migration before migrating to DB2. Generally, the organizations whose business footprint spanned multiple countries and languages saw the advantage of moving to a standard character platform.
- The migration to DB2 was seen as a way to augment their existing database environment. Generally, organizations retained a portion of their legacy database platform in the short term to compare the performance

and cost impacts of DB2 to the previous platform. Organizations noted over time they would evaluate the continued expansion of DB2 as long as the business case is positive.

- For the interviewed organizations, key areas of benefit generally fell into three areas. These included reduced cost of administration and management, reduced operational and capital costs. While not every organization noted gains in all three areas, as a whole, the business case was represented through supporting benefits.
- Risks associated with migration were mitigated by the ability to quickly migrate DBAs onto the new platform and a clear migration road map from IBM. Several organizations noted their concern of retraining staff from a legacy platform to DB2. As a result, organizations generally spent significantly more time planning and preparing for the migration than performing the actual migration itself.

Framework Assumptions

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

Table 2
Model Assumptions

Ref.	Metric	Value
A1	Hours per week	40
A2	Weeks per year	52
A3	Hours per year (M-F, 9-5)	2,080
A4	Hours per year (24x7)	8,736

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 highlights the incremental cost impact to the representative organization from the investment in IBM DB2. These costs include the incremental cost to purchase and run the solution as well as the implementation training.

- The average incremental cost of migrating the interviewed organizations to IBM DB2 is:
  - $157,954 — DB2 software licensing fees (note that in some cases, these fees covered multiple servers and multiple processing cores; they are actual license fees paid, not list prices).

- $63,037 — annual software maintenance fees over three years (approximately 20% of license fees).
- $10,800 — cost of implementation.
- $28,800 — cost of hardware.

- The incremental cost of training is $5,760.

Total Costs

Table 3 illustrates the average incremental costs of migrating to DB2 for the interviewed organizations in each year.

Table 3
Total Costs — Non-Risk-Adjusted

Costs	Initial	Year 1	Year 2	Year 3	Total	Present value
Software license costs	(157,594)				(157,594)	(157,594)
Software support and maintenance costs			(31,519)	(31,519)	(63,037)	(49,729)
Hardware costs	(18,000)	(3,600)	(3,600)	(3,600)	(28,800)	(26,953)
Implementation costs	(10,800)				(10,800)	(10,800)
Professional fees	(12,500)				(12,500)	(12,500)
Training fees	(5,760)				(5,760)	(5,760)
Total	($204,654)	($3,600)	($35,119)	($35,119)	($278,491)	($263,335)

Source: Forrester Research, Inc.

Benefits

Benefits for the representative organization were divided into three key themes:

- Reduced cost of administration.
- Reduced operational expenses.
- Storage savings through compression.

Reduced Cost Of Administration

Improved Backup And Recovery Times

One of the key areas of benefit noted by the interviewed organizations in migrating to the DB2 platform was the lower impact of backup and restore events on both the IT and end user organization.

Using older, legacy databases, several organizations noted the time-consuming process of copying data to or from disk or a storage device though the use of operating system calls. By leveraging new features found within the DB2 database, in particular DB2 Advanced Copy Services (ACS), organizations noted they were able to perform snapshot backup operations, leveraging DB2 aid in the backup and restore process. Organizations noted this automation has a direct impact on the time it takes to perform a backup and restore of both their SAP and non-SAP environments. In the SAP case, close integration between SAP and IBM DB2 enables additional improvements in backups and restore as compared with the previous environment.

In addition, most of the organizations interviewed were using database partitioning for both their SAP and non-SAP environments. In their previous environment, organizations that leveraged database partitioning had to back up and restore each partition individually, as the backup timestamp for each database partition is slightly different. Customers noted this resulted in added time for each event as the size and number of partitions grew. A feature found in DB2, single system view backup (SSV), allowed organizations to back up individual partitions as a whole, further driving down time and increasing cost savings around the backup and restore process.

To calculate this benefit both for the SAP and non-SAP environments, we assume the organization performs the same number of backup and restore events for both environments. In addition, the average length of the backup and restore window is the same between the two environments both before and after the shift to DB2. To calculate this benefit, we assume the organization performs two scheduled backups per month. The average length of these backups is 16 hours, and they are typically performed during nonbusiness hours. Of the total number of maintenance windows, roughly 15% go past their scheduled time and impact end user working hours. On average, if maintenance windows are extended to normal working hours, we assume the disruption typically lasts 2 hours and results in a 20% reduction in impact for the non-SAP environment and a 30% reduction in time for the SAP environment as a result of the migration. Tables 4 and 5 illustrate the calculation used for both the SAP and non-SAP environments.

Table 4

Faster Backup And Recovery — SAP Applications — Non-Risk-Adjusted

Ref.	Metric	Calculation	Per period
A1	Monthly number of backups/scheduled maintenance		2
A2	Months per year		12
A3	Average length of maintenance window (hours)		16
A4	Percent of maintenance windows impacting end users		15%
A5	Hours impacting business process		2
A6	Number of concurrent users		1,000
A7	Hourly salary		$90
A8	Reduction		30%
At	Faster backup and recovery — SAP applications	A2*A4*A5*A6*A7*A1	$194,400

Source: Forrester Research, Inc.

Table 5
Faster Backup And Recovery — Non-SAP Applications — Non-Risk-Adjusted

Ref.	Metric	Calculation	Per period
B1	Monthly number of backups/scheduled maintenance		2
B2	Months per year		12
B3	Average length of maintenance window (hours)		16
B4	Percent of maintenance windows impacting end users		15%
B5	Hours impacting business process		2
B6	Number of concurrent users		800
B7	Hourly salary		$90
B8	Reduction		20%
Bt	Faster backup and recovery — non-SAP applications	B2*B4*B5*B6*B7*B1	$103,680

Source: Forrester Research, Inc.

Improved Staff Efficiency

Improving the efficiency of existing storage and database staff was another common theme among the interviewed organizations. Over the past several years, these organizations were seeing rapid growth of their storage and database environment. As a result, the cost to manage both SAP and non-SAP environments increased yearly with the growth of staff to support. For these organizations, reducing the growth and cost of staffing by improving the efficiency of their existing employees was a key reason to migrate their environment to DB2.

Organizations noted several key features in DB2 that reduced the overall cost of administration as compared with the organization's older legacy database without automation features. On the database administration side, , customers noted savings from reduced staff allocation as well as a reduction in the growth of staff for backup and recovery, through the use of Data Cockpit as well as Autonomic features that automatically delete backup images, load copy images, and old log files that are no longer needed for recovery. Customers also noted improvements in storage administration through compression allowing the organization to reduce the level of storage under management, reducing the growth of storage and storage administration with storage associated with the DB2 database.

In order to construct this benefit, the representative organization currently has three administrators within its environment prior to the migration to DB2. The model also assumes that without the investment, the number of administrators on staff will increase by one full-time equivalent (FTE) per year to take into account the increase in database transactions and storage growth. The resulting shift to DB2 allows the organization to better manage its

database and storage environment, resulting in a 30% reduction in the growth of staffing. Table 6 illustrates the calculation used.

Table 6
Improved Staff Efficiency — Non-Risk-Adjusted

Ref.	Metric	Calculation	Per period
C1	Baseline number of DBAs		3
C2	Estimated annual growth of FTE		1
C3	Estimated reduction in annual growth		30%
C4	Fully DBA burdened cost		$180,000
Ct	Improved staff efficiency	C2*C3*C4	$54,000

Source: Forrester Research, Inc.

Improved Resolution Time

Another area of benefit that was a factor in moving organizations to DB2 is the ability of the IT organization to respond and resolve system incidents quickly with minimum impact to system availability. With the growth of the database environment and number of system queries, any disruption to the database environment impacts multiple end user processes. Being able to have greater visibility into the database performance and improved workload management allows the organization to better prepare for unplanned incidents and to resolve them more quickly, identifying the root cause faster. For example, with DB2 workload management, organizations can identify which activities or users are drawing most system resources and resolve any conflicts or impacts to performance in less time compared with their previous environment. While organizations noted benefit to both their SAP and non-SAP environments, the tight integration between SAP and IBM resulted in a greater resolution time as compared with the non-SAP environment.

To calculate the benefit to SAP and non-SAP environments, the model assumes that the representative organization can reduce the time to resolve system incidents by 30% for the SAP environment and 15% for the non-SAP environment. Assuming that the cost impact per resolution of incident is $450, the resulting benefit equates to $12,960 per year for the SAP environment and $9,760 for the non-SAP environment. Tables 7 and 8 illustrate the calculation used.

Table 7
Improved Resolution Time SAP — Non-Risk-Adjusted

Ref.	Metric	Calculation	Per period
D1	Number of incidents		24
D2	Cost per incident		$450
D3	Baseline time to resolve (hours)		4
D4	Average resolution time reduction		30%
Dt	Improved resolution time — SAP/DB2	D1*D2*D3*D4	$12,960

Source: Forrester Research, Inc.

Table 8
Improved Resolution Time Non-SAP — Non-Risk-Adjusted

Ref.	Metric	Calculation	Per period
E1	Number of incidents		24
E2	Cost per incident		$450
E3	Baseline time to resolve (hours)		6
E4	Average resolution time reduction		15%
Et	Improved resolution time — SAP/DB2	E1*E2*E3*E4	$9,720

Source: Forrester Research, Inc.

Reduced Operational Expenses

Reduced Maintenance Cost

In addition to the administration savings noted by the interviewed organizations, several organizations noted that the movement to DB2 enabled them to reduce their ongoing operational expenses as compared with their legacy database environment..

While differences in maintenance costs will vary on a client-by-client basis, the majority of the organizations saw the movement to DB2 as part of a larger strategy to leverage an existing IBM enterprise pricing agreement, allowing for economies of scale with a bigger footprint of IBM resources.

To calculate the savings in reduced operational expense, the model assumes a 15% reduction in the annual cost of maintenance as compared with the previous environment. Table 9 illustrates the calculation used.

Table 9
Reduction In Operational Expense — Non-Risk-Adjusted

Ref.	Metric	Calculation	Per period
F1	Recurring DB2 cost		$31,519
F2	Percent reduction		15%
Ft	Maintenance cost reduction	F1*F2	$4,728

Source: Forrester Research, Inc.

Improved Performance

The final area of impact noted by the interviewed organizations was related to performance. All organizations noted that a critical threshold for migration to DB2 was to see at least the same level of system performance as they realized on their old database. Most of the organizations interviewed had high levels of performance in both their SAP and non-SAP environments. As a result, direct gains in performance were not significant with the majority of the interviewees. However, many organizations noted additional cost-saving benefits while maintaining high levels of transactional performance to their end users. These included the ability to delay infrastructure spend through improvements in server performance as well as the ability to delay upgrades within their SAP environment.

Table 10
Delayed Infrastructure Spend

Ref.	Metric	Calculation	Year 1
G1	Baseline annual spend		$40,000
G2	Improvement in time between refresh		20%
Gt	Delayed infrastructure spend through server performance	G1*G2	$8,000

Source: Forrester Research, Inc.

Table 11
Increased Upgrade Windows — Non-Risk-Adjusted

Ref.	Metric	Calculation	Per period
H1	Cost of upgrade		$47,060
H2	Length of time between upgrades (months) baseline		30
H3	Length of time between upgrades (months) DB2		36
H4	Cost of capital		10%
H5	Monthly cost of capital		0.83%
Ht	Increased upgrade windows — SAP	H1*(H3-H2)*H5	$2,353

Source: Forrester Research, Inc.

Storage Savings Through Compression

The ability of DB2 to provide data compression to the active database was another key driver for organizations moving to DB2. With the rapid growth in data felt by all of the interviewed organizations, compression was seen as a way to reduce the footprint of the storage environment and ultimately reduce the total cost of storage. The benefit around compression was primarily seen in two ways. First, as a result of the introduction of compression into the database environment, the representative organization was able to realize savings by creating capacity within the existing database environment. Second, future growth of storage could be reduced as a result of compression to the database environment.

The actual level of compression and total savings will vary on several characteristics. First, the level of compression will vary depending on the type of data that is compressed and if the organization is compressing just the active database or the active database as well as backups. For the representative organization, the initial focus was on just the active database; however, additional savings may be realized if compression was expanded away from the primary database. In addition, a major factor in the actual amount of savings is the total cost of a terabyte of storage. Table 12 illustrates the typical total primary storage cost for a terabyte of storage. As part of this analysis, the model includes only the base cost of the disk itself in the storage savings calculations, as savings around staffing is factored into overall administration savings. The ultimate cost per terabyte of storage varied considerably customer by customer. As a result, Forrester chose to include a conservative base cost of storage. Readers are urged to apply their own estimates for storage cost.

Table 12
Typical Per-Terabyte Primary Cost Of Storage — Full Cost

Type — primary storage	Percent cost breakdown	Baseline
Disk storage plus tape	30%	$10,500
Hardware: networking (cables, routers, etc.)	15%	$5,250
Software (for storage)	14%	$4,900
Infrastructure: telcom	8%	$2,800
Infrastructure: power	2%	$700
Infrastructure: floor space	3%	$1,050
Staffing (for storage)	28%	$9,800
Total	100%	$35,000

Source: Forrester Research, Inc.

Tables 13 and 14 illustrate the savings from the reduction in growth from storage as well as the initial value of freed capacity. To calculate savings from a reduction in growth through compression, the model assumes the representative organization prior to the investment in DB2 is growing its storage footprint by roughly 30% per year. This results in an annual increase in primary storage for the database environment of between 3 TB and 4 TB per year over a three-year period. Based on the findings of the customer interviews, the model assumes an estimated reduction in growth of 30% per year due to compression within the active database. This results in annual savings of between $9,450 and $13,136 for the representative organization.

Table 13
Reduced Future Storage Costs

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
I1	Projected annual storage growth		30%		
I2	Projected storage growth (terabyte)		3	4	4
I3	Estimated reduction in growth		30%	30%	30%
I4	Cost per terabyte		$10,500		
I5	Purchases avoided (terabyte)		1	1	1
It	Reduced future storage costs through compression		$9,450	$12,285	$13,136

Source: Forrester Research, Inc.

To calculate the savings to existing storage, the model assumes an existing storage footprint of 10 TB for the active database. The customer interviews noted compression rates of between 35% and 75%, resulting in an average rate of compression of 55%. As a result, total savings equate to $57,750.

Table 14
Improved Storage Capacity

Ref.	Metric	Calculation	Per period
J1	Existing baseline storage (terabyte)		10
J2	Cost per terabyte		$10,500
J3	Estimated compression		55%
Jt	Improved storage capacity through compression	J1*J2*J3	$57,750

Source: Forrester Research, Inc.

Total Benefits

Table 15 illustrates the total three-year benefits. The total PV benefits equate to $869,891.

Table 15
Total Benefits — Non-Risk-Adjusted

Benefits	Year 1	Year 2	Year 3	Total	Present value
Faster backup and recovery — SAP applications	58,320	194,400	194,400	447,120	359,735
Faster backup and recovery — non-SAP applications	31,104	103,680	103,680	238,464	191,859
Improved staff efficiency	27,000	54,000	54,000	135,000	109,745
Improved resolution time — SAP/DB2	6,480	12,960	12,960	32,400	26,339
Improved resolution time — non-SAP/DB2	4,860	9,720	9,720	24,300	19,754
Maintenance cost reduction	3,152	6,304	6,304	15,759	12,811
Reduced future storage costs through compression	9,450	12,285	13,136	34,871	28,613
Improved storage capacity through compression	57,750			57,750	52,500
Delayed infrastructure spend through server performance	8,000			8,000	7,273
Increased upgrade windows — SAP	2,353	2,353	2,353	7,059	5,852
Total	$208,469	$395,702	$396,552	$1,000,723	$814,479

Source: Forrester Research, Inc.

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 DB2 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 A).

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 DB2 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 DB2, 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, as they represent the expected values considering risk.

The following implementation risks that affect costs are identified as part of this analysis:

- Installation and testing could demand more time than originally anticipated.
- Acquisition costs could be higher than originally anticipated for hardware and software.

The following impact risk is identified as part of the analysis:

- The amount of development savings may be lower than originally anticipated due to the time it takes to train and move to the DB2 environment.

Table 16 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.

Table 16
Cost And Benefit Risk Adjustments

Costs	Low	Most likely	High	Mean
Total cost	96%	100%	105%	102%
Benefits	**Low**	**Most likely**	**High**	**Mean**
Total benefit	80%	100%	110%	95%

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 ROI, NPV, and payback period for the organization's investment in DB2. These are shown in Table 17 below.

Table 17
Cash Flow — Non-Risk-Adjusted

Cash flow — original estimates						
	Initial	Year 1	Year 2	Year 3	Total	Present value
Costs	($204,654)	($3,600)	($35,119)	($35,119)	($278,491)	($263,335)
Benefits		$208,469	$395,702	$396,552	$1,000,723	$814,479
Net benefits	($204,654)	$204,869	$360,583	$361,434	$722,232	$551,144
ROI	209%					

Source: Forrester Research, Inc.

Table 18 below shows the risk-adjusted ROI, NPV, and payback period values. These values are determined by applying the risk-adjustment values from Table 16 in the Risk section to the cost and benefits numbers in Tables 3 and 15.

Table 17
Cash Flow — Risk-Adjusted

Cash flow — risk-adjusted estimates						
	Initial	Year 1	Year 2	Year 3	Total	Present value
Costs	($204,720)	($3,240)	($35,074)	($35,074)	($278,108)	($263,004)
Benefits		$198,994	$372,236	$373,069	$944,299	$768,829
Net benefits	($204,720)	$195,754	$337,162	$337,995	$666,191	$505,825
ROI	192%					

Source: Forrester Research, Inc.

IBM DB2: Overview

According to IBM, IBM DB2 is optimized to deliver industry-leading performance and high availability across multiple workloads, while lowering administration, storage, development, and server costs.

- Reliability: DB2 makes it possible to secure data from external and internal threats, ensuring IT applications perform with consistency and reliability. With features that allow easy authentication, authorization, and multilevel access control, DB2 offers a mix of security and development overhead designed to ensure data consistency.
- Availability: In the event of failover, DB2 is built to provide redundancy and seamless recovery to all processes supported by the database..
- Easy administration: DB2 provides improvements in administration. With self-healing, self-monitoring, self-protecting, and self-configuring Features, DB2 has many built-in features such as the self-tuning memory manager that reduces the human intervention needed to optimize the use of computing resources for target throughput.
- Low operating costs: DB2 offers features such as deep compression that can lower storage requirements as well as improvements in IT infrastructure costs, electricity, and environmental costs as well. In addition, DB2 lowers personnel costs, a large portion of the IT bill, through easier administration, leaving DBAs to focus on value-adding activities instead of housekeeping chores.
- Lower customer risk: For SAP customers, the IBM/SAP alliance allows for , near-concurrent certification and allows customers to have a longer window of value realization. Combine this with unique technical product capabilities and the fact that SAP itself has chosen to run its internal environment on DB2.
- The database partitioning feature (DPF) of DB2 is unique among the databases that support SAP and has been fully supported by SAP BW since version 2.0. DPF provides scalability for data warehouse/business intelligence types of queries, and its linear scalability characteristics enable customers to effectively size their DB2 configuration for growth.
- Multidimensional clustering (MDC) tables provide the capability to cluster data in blocks based on multiple column dimensions within a table and guarantee that this data clustering will be maintained. MDC tables also utilize a unique block-based indexing capability that reduces index maintenance and overall index size.

Appendix A: 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 forms 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 a 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 B: Description Of Representative Organization

The representative organization provides a vehicle to summarize the common costs and benefits heard as a result of the interview process. For this analysis, the representative organization has the following characteristics:

- The representative organization is a Europe-based financial services organization with offices located throughout the globe. The organization currently has roughly 14,000 employees and annual revenue of 780 million euros.
- The representative organization has not upgraded their database environment in several years and is looking to take advantage of the new features found in the current database platforms.
- The IT organization consists of 300 staff with roughly 10% of its staff supporting its application environment. The largest application managed by IT is its SAP application with instances of HR and CRM. The organization has been using SAP for the past 10 years.
- The organization leverages multiple database platforms to support its SAP and non-SAP application environments. The long-term strategy for the organization is to keep multiple database platforms available and not to be locked into any one single database vendor.
- Over the past several years, the organization has seen a rapid rise in demand for storage related to core business applications as well as improvements in performance. The organization had seen a growth in storage by an average of 20% to 40% per year.

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 at 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: Endnotes

[1] Forrester risk-adjusts the summary financial metrics to take into account the potential uncertainty of the cost and benefit estimates.