

A Forrester Total Economic
Impact™ Study
Commissioned By
IBM

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July 2015

The Total Economic Impact™ Of IBM DB2 With BLU Acceleration

Cost Savings And Business Benefits
Enabled By IBM DB2 With BLU
Acceleration

FORRESTER®

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Executive Summary

IBM commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying IBM DB2 with BLU Acceleration. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of IBM DB2 with BLU Acceleration on their organizations, and to leverage in-memory database technology to win, serve, and retain customers.

To better understand the benefits, costs, and risks associated with an IBM DB2 with BLU Acceleration implementation, Forrester interviewed an existing customer with multiple years of experience using IBM DB2 and IBM DB2 with BLU Acceleration technology. IBM DB2 with BLU Acceleration provides organizations with in-memory computing capabilities, driving increased database performance, reduced operational and capital costs, and improved administrative efficiencies.

In most cases, customers are moving from a previous instance of IBM DB2 in order to take advantage of the in-memory computing capabilities found in IBM DB2 with BLU Acceleration. With IBM DB2 with BLU Acceleration, the interviewed organization was able to streamline and automate processes across key functions and lines of business within a single tenant environment, enabling it to meet its objectives, increase productivity, and keep costs in check.

IBM GENERATES IMPROVED DATABASE PERFORMANCE WITH IBM DB2 WITH BLU ACCELERATION

Our interview with the existing customer and subsequent financial analysis and research found that a representative organization based on the interviewed organization would experience the risk-adjusted ROI, benefits, and costs shown in Figure 1.¹

The interviewed organization analysis points to non-risk-adjusted benefits of approximately \$308,000 per year (\$924,057 total) versus costs of \$119,000 per year (\$356,500 total), adding up to a yearly non-risk-adjusted net present value (NPV) of \$189,000 (\$567,557 total). The risk adjusted values in Figure 1 represent a lower benefit and higher cost figures taking into account the variability of final estimates.

FIGURE 1

Financial Summary Showing Three-Year Risk-Adjusted Results



Source: Forrester Research, Inc.

- › **Benefits.** The interviewed organization experienced the following risk-adjusted benefits:
- **Compression.** IBM DB2 with BLU Acceleration uses advanced compression techniques to deliver massive storage savings. Additional storage savings result from the elimination of indexes for reporting and analytics. With order-preserving compression, data is still usable in its compressed state.
 - **Performance.** Queries that used to take hours now take minutes or seconds with IBM DB2 with BLU Acceleration because it is optimized to take advantage of the CPU cache and system memory to accelerate analytics performance. Massive data sets do not need to be maintained in-memory for these performance benefits.
 - **Technology cost avoidance.** This technology will allow the organization to realize a significant cost savings over the life of the servers, especially when considering the annual growth in data assets. The organization did not need to purchase specialized hardware as part of the upgrade to IBM DB2 with BLU Acceleration and was able to leverage existing x86 hardware for the implementation.
- › **Costs.** The interviewed organization experienced the following risk-adjusted costs:
- **Software licensing fees.** These are initial, one-time fees paid to IBM for access to the DB2 platform.
 - **Annual maintenance fees.** This is a recurring fee paid to IBM for continued ongoing maintenance and/or subscriptions.
 - **Implementation and professional services fees.** These are upfront costs to migrate existing applications to IBM DB2 with BLU acceleration.

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 ROI that other organizations will receive. Forrester strongly advises that readers use their own estimates within the framework provided in the report to determine the appropriateness of an investment in IBM DB2 with BLU Acceleration.
- › IBM reviewed and provided feedback to Forrester, but Forrester maintains editorial control over the study and its findings and does not accept changes to the study that contradict Forrester's findings or obscure the meaning of the study.
- › IBM provided the customer names for the interviews but did not participate in the interviews.

TEI Framework And Methodology

INTRODUCTION

From the information provided in the interviews, Forrester has constructed a Total Economic Impact (TEI) framework for those organizations considering implementing IBM DB2 with BLU Acceleration. The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision, to help organizations understand how to take advantage of specific benefits, reduce costs, and improve the overall business goals of winning, serving, and retaining customers.

APPROACH AND METHODOLOGY

Forrester took a multistep approach to evaluate the impact that IBM DB2 with BLU Acceleration 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 IBM DB2 with BLU Acceleration and the marketplace for IBM DB2 with BLU Acceleration.
- › Interviewed an organization currently using IBM DB2 with BLU Acceleration 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.
- › Risk-adjusted the financial model based on issues and concerns the interviewed organization highlighted in interviews. Risk adjustment is a key part of the TEI methodology. While the interviewed organization provided cost and benefit estimates, some categories included a broad range of responses or had a number of outside forces that might have affected the results. 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 DB2 with BLU Acceleration's service: benefits, costs, flexibility, and risks.

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

FIGURE 2

TEI Approach



Source: Forrester Research, Inc.

Analysis

INTERVIEWED ORGANIZATION

For this study, Forrester conducted a primary interview with a representative from a large US-based financial services organization.

Based on the interview and subsequent research, Forrester constructed a TEI framework and an associated ROI analysis that illustrates the areas financially affected. The interviewed organization has the following characteristics:

- › It is a US-based financial services organization leveraging both a previous version of IBM DB2 and IBM DB2 with BLU Acceleration.
- › The organization has a large mix of databases ranging in size from 100TB down to 500GB. The average database (DB) size is 3TB.
- › The organization currently has five IBM DB2 with BLU Acceleration databases in production. The organization originally started slow in order to test and confirm the stability of the platform.
- › Any new DB created is on v10 of IBM DB2 with the goal to get everything to 10.5, before IBM DB2 with BLU Acceleration can be more widely adopted throughout the organization.
- › The organization has 10,000-plus DBs, with 50 DBAs, located both onshore and offshore. There are only a few centralized DBAs. The organization also has managed services (which are included in the 50) and is expanding these services because the number of requests and DBs are both increasing.

After an extensive testing and evaluation process for an in-memory computing solution, the interviewed organization chose IBM and began deployment.

“We were impressed by the significant improvement in query performance.”

~IT architect

INTERVIEW HIGHLIGHTS

This study consisted of a single interview with an IBM customer, a large US-based financial services firm.

The interview uncovered several key points that drove the creation of the financial analysis:

- › The interviewed organization is a global financial services firm that operates in more than 40 countries and has more than 60,000 employees worldwide.
- › This organization has a large IT environment with more than 10,000 databases in use and more than 50 DBAs managing their everyday use. The organization has hundreds of terabytes of data assets that are growing, and they routinely process millions of transactions every day.
- › The incentive and timing to move to IBM DB2 with BLU Acceleration was twofold:
 - **Resource constraints.** With the amount of data and volume of queries processed each day, the organization needed a way to improve performance. Before the organization implemented IBM DB2 with BLU Acceleration, its current state was unsustainable. It was resource intensive for the previous environment to manage the growing volumes of data coming into the organization. The organization's internal support staff was also spending many hours per week creating indexes and maintaining queries. IBM DB2 with BLU Acceleration offered the organization the ability to do more with less.
 - **Growth in applications.** In addition to its increasing volume of data, the organization has a growing number of business applications that it must support. These applications demand significant performance capabilities of their own. When the data that is consumed by these applications gets factored in, the applications require a lot of resources in order to run effectively. Since the financial services industry is heavily regulated, the organization needs the ability to react to regulator requests quickly. IBM DB2 with BLU Acceleration allowed the organization to reposition parts of its application portfolio to reflect "best of breed" analytics products and get access to the requested information very quickly with the addition of pureScale for OLTP. IBM DB2 with BLU Acceleration allowed the organization to realize a significant increase in performance of its application portfolio as well as elevated stability that it would not otherwise have.

“With BLU, you can have a row and column hybrid, creating a new capability of the shadow tables. This extends the use of single host machines.”

~ Technology executive at IBM customer

RESULTS

The interview revealed:

- › **IBM DB2 with BLU Acceleration delivers compression.** The organization noted significant increases in storage compression as compared with prior versions of IBM DB2.
- › **IBM DB2 with BLU Acceleration delivers performance.** The organization also noted that query times were reduced by as much as 85%, leading to faster analytical reporting with in-memory computing.
- › **IBM DB2 with BLU Acceleration delivers cost efficiency.** In addition, the organization noted that the deployment of the latest version of IBM DB2 with BLU Acceleration allowed it to reduce ongoing capital expenditures.

BENEFITS

The interviewed organization experienced a number of quantified benefits in this case study.



Compression

The organization saw a huge improvement in data compression, and this benefit was realized immediately after IBM DB2 with BLU Acceleration was implemented. The amount of data that the organization collects increases exponentially each year, and with the increase in data comes an increase in demand for that data or the desire to utilize it to drive value to the business. With previous editions of IBM DB2, the organization was routinely experiencing a data compression rate between 2x and 4x. With IBM DB2 with BLU Acceleration, the compression rate increased to between 5x and 12x. A big advantage to in-memory computing is the ability to analyze data in the CPU cache and system memory while it is still compressed. This ability to analyze compressed data saves CPU cycles that would have otherwise been used to decompress the data.

In order to calculate this benefit, we analyzed the average annual data growth of the organization's data. In this case, the organization's data assets are growing by approximately 33% on average. With IBM DB2 with BLU Acceleration, the organization is realizing a 10% decrease in its average storage use, which over a three-year period is a dramatic savings in storage costs. The opportunity for the organization to have greater data compression after Year 3 than it had in Year 1 is a very attractive premise for this organization.

TABLE 1
Improved Compression Cost Savings

Ref.	Metric	Year 1	Year 2	Year 3
A1	Number of backed-up databases	5	5	5
A2	Number of backups held per production DB	50	50	50
A3	Cost per TB	\$120	\$120	\$120
A4	Average size of database backups (TB)	3	3	3
At	Estimated annual storage growth	150%	150%	150%
	Estimated improvement in storage compression	75%	75%	75%
Atr	Total savings (risk-adjusted)	\$67,500	\$101,250	\$151,875

Source: Forrester Research, Inc.



Performance

From a performance perspective, the organization saw a tremendous improvement with IBM DB2 with BLU Acceleration versus previous versions of IBM DB2 with respect to the querying capabilities. Queries that used to take hours now take minutes or seconds with IBM DB2 with BLU Acceleration. This is a result of IBM DB2 with

BLU Acceleration encoding data optimally through the CPU cache and system memory along with other innovations like data skipping and use of single instruction, multiple data (SIMD). The encoding is order-preserving, meaning the data can be analyzed while it's still compressed. This saves CPU time in uncompressing the data. In addition, the organization saw a significant decrease in time-to-market. Traditional database product rollouts required data model design, loading data, stress testing with queries, indexing, and user acceptance testing (UAT) of the project. With BLU Acceleration, once the data is loaded, it is immediately available for analysis.

The key metrics used to quantify this benefit were the average query time with BLU Acceleration and the costs associated with such queries. Assuming an average query time of 15 minutes with the previous version of IBM DB2 and an 85% decrease in query time with IBM DB2 with BLU Acceleration, the total amount of querying time per day decreases dramatically. Since IBM DB2 with BLU Acceleration eliminates the need for database tuning with its ease of use, there are significant cost savings associated with this feature. Assuming a \$60 hourly resource cost for database tuning along with the 85% decrease in tuning time using IBM DB2 with BLU Acceleration, this organization forecasts a notable cost savings over a three-year period.

“With the columnar feature of BLU, there are no indexes to create; it’s literally ‘load and go.’”

~ Technology executive at IBM customer

TABLE 2
Improved Performance From Reduced Query Times

		Low	Med	High
Average query time with DB2 (min)		5	15	30
Average query % decrease		85%	85%	85%
Number of queries (per day)		20	100	75
Cost per hour	\$60			
Average yearly query increase	20%			
Database tuning time (hours/week)		1.67	25.00	37.50
Database tuning time with BLU (hours/week)		0.25	3.75	5.63
Savings		\$85.00	\$1,275.00	\$1,912.50
Low		\$4,250	\$5,100	\$6,120.00
Medium		\$63,750	\$76,500	\$91,800
High		\$95,625	\$114,750	\$137,700

Source: Forrester Research, Inc.



Direct Technology Cost Avoidance

Since IBM DB2 with BLU Acceleration offers the ability to dramatically compress an organization's data assets, we can assume a savings associated with storage administration. The organization understands that it will be able to reduce the overall amount of hosts per instance, and since IBM DB2 with BLU Acceleration increases the capabilities of a single host, the organization does not need as much database partitioning. This technology will allow the organization to realize a significant cost savings over the life of the servers, especially when considering the annual growth in data assets.

The model assumes 50 backups per production database, and a \$0.04 cost per gigabyte. The average database backup for the organization is approximately 3TB, and over a three-year period, the organization will realize significant savings as its data assets continue to grow.

TABLE 3
New Product Cost Avoidance

	Value
Cost avoidance in that a company would not have to invest in another new product, including implementing, integrating, training, support resources, etc. No retraining is needed; BLU is seamlessly integrated into DB2.	\$150,000

Source: Forrester Research, Inc.

Total Benefits

Table 4 shows the total of all benefits across the three areas listed above, as well as present values (PVs) discounted at 10%. These estimates are then risk-adjusted, providing a more conservative estimate for the business case. Over three years, the interviewed organization expects risk-adjusted total benefits to be a PV of more than \$883,000.

TABLE 4
Total Benefits (Risk-Adjusted)

	Year 1	Year 2	Year 3	Total	Present Value (PV)
Performance	\$163,625	\$196,350	\$235,620	\$595,595	\$488,048
Lower storage costs	\$67,500	\$101,250	\$151,875	\$320,625	\$259,147
New product cost avoidance	\$150,000	\$0	\$0	\$150,000	\$136,364
Total	\$381,125	\$297,600	\$387,495	\$1,066,220	\$883,558

COSTS

The impact of cost is accrued in two different areas described below: increasing the investment in IBM and the organization's internal preparation and planning costs, which together amount to approximately \$247,000. Please note that the interviewed organization was currently on an IBM enterprise agreement, allowing it to purchase the upgrade within the terms of the purchase agreement. The cost for other organizations may vary. Customers with a different deployment can take advantage of TB-based pricing available from IBM, potentially reducing investment costs further.

› The organization saw the following costs:

- Increased investment in software licensing fees.
- Increased investment in annual software maintenance.
- Cost of implementation.

Total Costs

Table 5 illustrates the total incremental costs of the IBM platform for the interviewed organization.

TABLE 5					
Total Costs (Risk-Adjusted)					
	Year 1	Year 2	Year 3	Total	Present Value (PV)
Incremental license	\$165,000	\$0	\$0	\$165,000	\$150,000
Maintenance	\$0	\$33,000	\$33,000	\$66,000	\$52,066
Implementation and professional services	\$50,000	\$0	\$0	\$50,000	\$45,455
Total	\$215,000	\$33,000	\$33,000	\$281,000	\$247,521

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 IBM DB2 with BLU Acceleration 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).

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 IBM DB2 with BLU Acceleration 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 DB2 with BLU Acceleration, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for cost and benefit estimates.

Quantitatively capturing implementation risk and impact risk by directly adjusting the financial estimates results provides 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 since they represent the expected values considering risk.

The following impact risk that affects benefits was 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 an integrated environment.

The following implementation risks that affect costs were 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 amount of development savings may be lower than originally anticipated due to the time it takes to train and move to an integrated environment.

Table 6 shows the values adjusted for risk and uncertainty in the cost and benefit estimates for the interviewed organization. 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 Benefits and Costs sections can be used to determine the ROI, NPV, and payback period for the interviewed organization's investment in IBM DB2 with BLU Acceleration.

Table 6 below shows the risk-adjusted ROI, NPV, and payback period values. These values are determined by applying the risk-adjustment in the Risks section to the unadjusted results in each relevant cost and benefit section.

TABLE 6
Cash Flow (Risk-Adjusted)

	Year 1	Year 2	Year 3	Total	Present Value
Benefits	\$330,308	\$257,920	\$335,829	\$924,057	\$793,558
Costs	(\$279,500)	(\$38,500)	(\$38,500)	(\$356,500)	(\$314,835)
Net benefits	\$50,808	\$219,420	\$297,329	\$567,557	\$478,723
ROI	152%				
Payback period	Within 12 months				

Source: Forrester Research, Inc.

FRAMEWORK ASSUMPTIONS

Table 7 provides the model assumptions that Forrester used in this analysis.

The discount rate used in the PV and 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.

TABLE 7
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

Source: Forrester Research, Inc.

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. TEI assists technology vendors in winning, serving, and retaining customers.

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 enterprise-wide 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

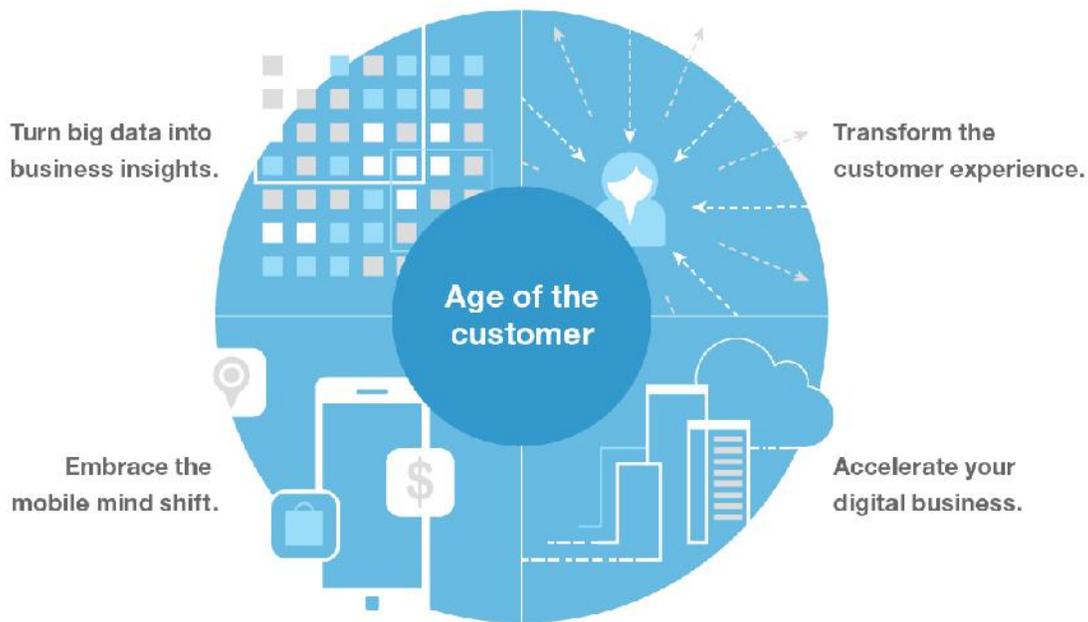
Risks measure the uncertainty of benefit and cost estimates contained within the investment. Uncertainty is measured in two ways: 1) the likelihood that the cost and benefit estimates will meet the original projections and 2) the likelihood that the estimates will be measured and tracked over time. TEI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

Appendix B: Forrester And The Age Of The Customer

Your technology-empowered customers now know more than you do about your products and services, pricing, and reputation. Your competitors can copy or undermine the moves you take to compete. The only way to win, serve, and retain customers is to become customer-obsessed.

A customer-obsessed enterprise focuses its strategy, energy, and budget on processes that enhance knowledge of and engagement with customers and prioritizes these over maintaining traditional competitive barriers.

CMOs and CIOs must work together to create this companywide transformation.



Forrester has a four-part blueprint for strategy in the age of the customer, including the following imperatives to help establish new competitive advantages:



Transform the customer experience to gain sustainable competitive advantage.



Accelerate your digital business with new technology strategies that fuel business growth.



Embrace the mobile mind shift by giving customers what they want, when they want it.



Turn big data into business insights through innovative analytics.

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 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 organizations 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 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 the 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.

Sums and present value calculations of the Total Benefits, Total Costs, and Cash Flow tables may not exactly add up, as some rounding may occur.

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 Risks.

IML14492-USEN-01