

A Forrester Total Economic Impact™
Study Commissioned By IBM
October 2017

The Total Economic Impact™ Of IBM Streams

Cost Savings And Business Benefits
Enabled By IBM Streams

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Executive Summary

IBM provides an event stream processing solution, Streams, which helps its customers improve their real-time analytics (AKA streaming analytics) capability within their operational systems environments. 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 Streams within complex operational environments to detect urgent situations and orchestrate actions in real time. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of Streams on their organizations.

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed one customer with several years of experience using Streams. The organization is using Streams as part of a real-time analytics strategy to improve operational decision making and optimize resource planning.

Prior to using Streams, the interviewed customer was using several internally built solutions to analyze data without real-time analytical capability. As the organization's environment grew in complexity and size, the lack of real-time analytics and actions led to increased costs and delays to operations and, therefore, negative consequences to customer experience. The organization decided it needed to simplify and consolidate into a single solution that also offered real-time analytics.

Key Findings

Quantified benefits. The interviewed organization experienced the following risk-adjusted quantified benefits:

- › **Improved operational efficiency.** The organization was looking to consolidate multiple home-grown data applications into a common streaming analytics platform. The use of Streams allowed the organization to reuse key parts of existing application code in a flexible, real-time, and scalable environment.
- › **Reduced infrastructure cost.** Streams also provided the organization with the ability to avoid extending the existing database infrastructure as an alternative real-time streaming analytics platform.
- › **Faster response times.** Streams was part of a larger initiative to move the organization to significantly faster response times for abnormal operational incidents. This enabled the organization to better plan key processes that minimize customer impact.

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

- › **License and maintenance.** Includes upfront license costs (priced per CPU) and ongoing maintenance.
- › **Implementation.** Includes both internal and external resources to plan, test, and train on the new platform.
- › **Administration.** Includes the cost to manage and administer the Streams platform.

Forrester's interview with an existing customer and subsequent financial analysis found that the interviewed organization experienced present value (PV) benefits of \$8.6 million over three years versus PV costs of \$3.4



ROI
150%



Benefits PV
\$8.6 million



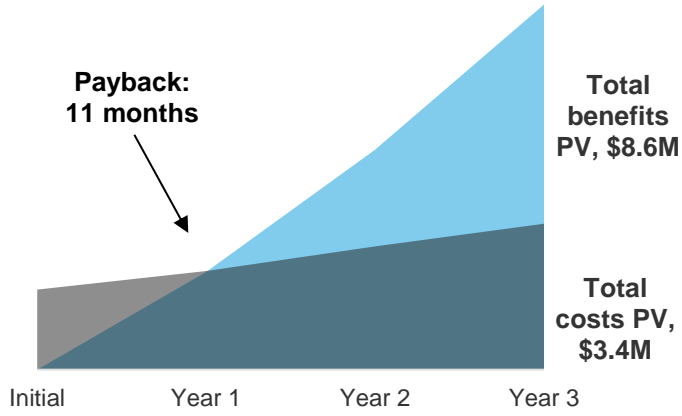
NPV
\$5.2 million



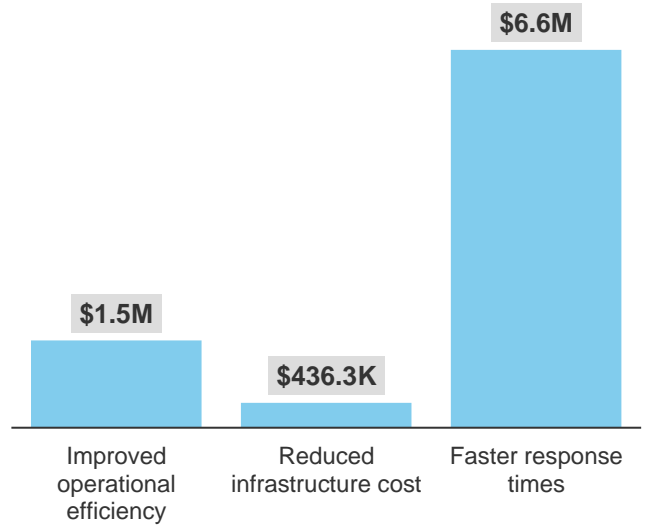
Payback
11 months

million, adding up to a net present value (NPV) of \$5.2 million and an ROI of 150%.

Financial Summary



Benefits (Three-Year)



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 Framework And Methodology

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

The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision. Forrester took a multistep approach to evaluate the impact that IBM Streams can have on an organization:



DUE DILIGENCE

Interviewed IBM stakeholders and Forrester analysts to gather data relative to Streams.



CUSTOMER INTERVIEW

Interviewed one organization using Streams to obtain data with respect to costs, benefits, and risks.



FINANCIAL MODEL FRAMEWORK

Constructed a financial model representative of the interview using the TEI methodology and risk-adjusted the financial model based on issues and concerns of the interviewed organization.



CASE STUDY

Employed four fundamental elements of TEI in modeling IBM Streams' impact: benefits, costs, flexibility, and risks. Given the increasing sophistication that enterprises have regarding ROI analyses related to IT investments, Forrester's TEI methodology serves to provide a complete picture of the total economic impact of purchase decisions. Please see Appendix A for additional information on the TEI methodology.

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by IBM and delivered by Forrester Consulting. It is not meant to be used as a competitive analysis.

Forrester makes no assumptions as to the potential ROI that other organizations will receive. Forrester strongly advises that readers use their own estimates within the framework provided in the report to determine the appropriateness of an investment in IBM Streams.

IBM reviewed and provided feedback to Forrester, but Forrester maintains editorial control over the study and its findings and does not accept changes to the study that contradict Forrester's findings or obscure the meaning of the study.

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

The Streams Customer Journey

BEFORE AND AFTER THE STREAMS INVESTMENT

Interviewed Organization

For this study, Forrester interviewed an IBM Streams customer:

- › A large, global transportation provider headquartered in North America
- › Using IBM Streams to analyze periodic, abnormal events and react faster to return to its normal daily operations.

Key Challenges

Prior to the investment in Streams, the organization lacked a way to plan and predict responses to abnormal events to operations in real time or near real time.

- › **Increasing complexity within the organization.** Prior to the investment in Streams, the organization relied on a bundle of internally built applications to help plan and respond to abnormal operations. Abnormal operations are cases in which the transportation network is affected by factors beyond the organization's control. This could include disruption due to weather events or abnormal traffic events. The organization needed a way to analyze data in real time and make rapid decisions to plan for operations that would minimize impact to customers.
- › **Increasing demand for real-time analytics.** The organization recently merged, requiring reconciliation of systems between both organizations. With the growth in complexity of operations built on J2EE code, the organization felt an acute need to improve the time between data analysis and action.
- › **Relentless cost efficiency.** The organization operates in a highly competitive global environment, with strong pressure for cost efficiency both inside and outside the IT organization. The organization needed a way to improve its real-time analytics capability while keeping operational and infrastructure costs to a minimum.

Solution Requirements

The interviewed organization searched for a solution that could:

- › Provide a real-time, event-driven streaming analytics solution — to have a solution that provides a homogenous holistic view across the organization, rather than having point solutions come up with their own little domain models.
- › Take actions in real time. Real-time insights alone are not enough. The solution also needed to be capable of automatically triggering other applications and business processes to respond as soon as possible to abnormal events.
- › Be flexible and scalable to handle increases in additional use cases as well as increases in the size of data.
- › Leverage existing code artifacts within Streams without rewriting or refactoring.

“Streams would allow us to be event-enabled without us having to create a lot of plumbing or the framework around event orchestration or event management.”

IT manager, transportation



“There are such events that are only valid for such amount of time. And if we don't react to those events within the timeframe, the solutions that gets generated beyond that timeframe, it's of no use. So, we needed faster response time as well. We needed to be more agile in terms of processing.”

IT manager, transportation



After an extensive request for proposal (RFP) and business case process evaluating multiple vendors, the interviewed organization chose Streams and began deployment:

- › Streams was deployed in 2014, replacing 20 existing internally built applications over a 24-month time period.
- › Initial native applications consisted of mainly a dashboard type of application that constantly consumed data from about 30 external sources, systems of record, or mainframe systems; it then processed that data and created one view for the operations to be used — to have a view of the operations.
- › Streams was seen as the best fit into the organization's existing environment.

Key Results

The interview revealed that key results from the Streams investment include:

- › **The ability to drive operational efficiency.** Streams helped enable the migration of older J2EE data applications to the new real-time streaming environment, allowing the organization to reuse the existing code base and reducing the overall cost of the migration.
- › **A way to avoid costly infrastructure hardware.** Streams allowed the organization to avoid a costly build-out of its existing database infrastructure by providing a lightweight platform that minimized the impact to the existing infrastructure.
- › **The ability to dramatically increase the speed to respond to abnormal incidents.** Streams provided a real-time streaming analytics platform that allowed the organization to pull together data from disparate internal and external sources, resulting in faster, better decisions to abnormal operations, ultimately having a positive customer experience.

“Not only did we go to a real-time event-based system; we moved away from your classic — I say classic — but we moved away from a classic interior architecture with a database backing it to using Streams with in-memory compute grid.”

IT operations, transportation



“One of the things that we wanted to do is, I know we could have distributed the data via an empty waterfall type mechanism, but the solutions that we're solving for are our own production for the floor. “

IT operations, transportation



Financial Analysis

QUANTIFIED BENEFIT AND COST DATA

Total Benefits

REF.	BENEFIT	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Atr	Improved operational efficiency	\$192,375	\$769,500	\$961,875	\$1,923,750	\$1,533,508
Btr	Reduced infrastructure cost	\$356,250	\$71,250	\$71,250	\$498,750	\$436,279
Ctr	Faster response times	\$1,984,500	\$2,646,000	\$3,528,000	\$8,158,500	\$6,641,506
Total benefits (risk-adjusted)		\$2,533,125	\$3,486,750	\$4,561,125	\$10,581,000	\$8,611,293

Benefit 1: Improved Operational Efficiency

As part of the investment in Streams, the organization saw an opportunity to modernize and standardize its existing internally built applications. In many cases, these applications were built by individual lines of business, and the organization was looking for a way to consolidate and standardize on a single platform. The costs of managing and supporting these platforms were increasing yearly, and the organization was looking for a way to replace but also reuse as much of the existing code base to minimize the cost of migration.

To calculate this benefit, Forrester assumes that the representative organization gradually migrated existing applications to the new platform. As part of the migration, the annual run and maintenance costs were reduced on average by 30% to take into account the shift to the new platform. Forrester also assumes that the average cost to run the application in the prior environment was \$135,000 per year. In the first year, five applications were migrated, increasing to 25 by Year 3.

Extrapolating this benefit to other organizations, Forrester assumes that the actual benefit may vary by a number of factors including the complexity and number of applications and the speed of migration.

To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year risk-adjusted total PV of \$1,533,508.

The table above shows the total of all benefits across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the interviewed organization expects risk-adjusted total benefits to be a PV of more than \$8.6 million.

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

Improved Operational Efficiency: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3
A1	Number of applications		5	20	25
A2	Average run/maintenance cost per applications	\$135,000	\$135,000	\$135,000	\$135,000
A3	% reduction in cost	30%	30%	30%	30%
At	Improved operational efficiency	A1*A2*A3	\$202,500	\$810,000	\$1,012,500
	Risk adjustment	↓5%			
Atr	Improved operational efficiency (risk-adjusted)		\$192,375	\$769,500	\$961,875

Benefit 2: Reduced Infrastructure Cost

Another key benefit driving the interviewed organization was the ability to avoid the cost of an expensive infrastructure build-out to support the legacy applications. The new Streams infrastructure relied on a more flexible and scalable model, reducing the reliance of building out proprietary infrastructure. As the organization noted, “So the alternative would have been to build out a very complex database infrastructure and the cost associated with that investment”

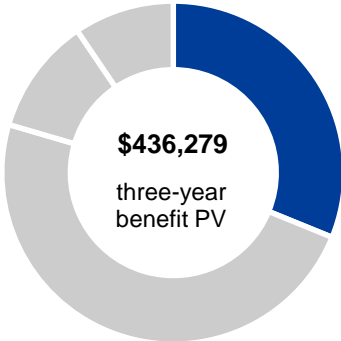
For the interviewed organization, Forrester assumes that:

- › It cost the organization \$2.5 million initially, in addition to recurring maintenance costs, to build out its existing infrastructure environment and the growth of demand for real-time analytics.
- › Forrester estimates that the cost of Streams was 15% lower than the cost to build out an alternative scenario.

The reduction in infrastructure cost expense will vary with:

- › The number of software development resources used.
- › The time needed to develop the software integrations.
- › The fully loaded compensation of software developers.

To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year risk-adjusted total PV of \$436,279.



Reduced infrastructure cost: **5%** of total benefits

Reduced Infrastructure Cost: Calculation Table

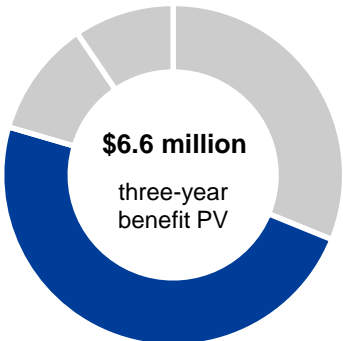
REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3
B1	Cost to build out alternative batch platform		\$2,500,000	\$500,000	\$500,000
B2	% reduction in cost	15%	15%	15%	15%
Bt	Reduced infrastructure cost	B1*B2	\$375,000	\$75,000	\$75,000
	Risk adjustment	↓5%			
Btr	Reduced infrastructure cost (risk-adjusted)		\$356,250	\$71,250	\$71,250

Benefit 3: Faster Response Times

For the interviewed organization, a key driver in the move to operational streaming analytics was to improve the time between analysis and decision making around abnormal operations. As the organization stated, “We see Streams as applying to more abnormal events and to improve the time to respond to those events that we were already analyzing.”

Through Streams, the organization was able to look directly into data streams and analyze, in real time, data related to abnormal incidents. In the prior state, data analysis was delayed, resulting in loss of critical time waiting for data to be analyzed. In addition, more events could be analyzed, allowing for the organization to plan and predict the impact of different cascading events to operations.

To model the impact of Streams, Forrester assumes a target of 80 abnormal incidents per year by Year 3. Through interviews, Forrester assumes a 60% time improvement in the time between data analysis and making a decision that affects operations.



Forrester assumes that the actual benefit may vary by a number of factors including the complexity and number of applications and the speed of migration.

To account for these risks, Forrester adjusted this benefit downward by 2%, yielding a three-year risk-adjusted total PV of \$6.6 million.

Faster Response Times: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3
C1	Number of abnormal incidents per year		45	60	80
C2	Average time-to-resolution — prior (min)	60	60	60	60
C3	% reduction	60%	60%	60%	60%
C4	Average time-to-resolution — post (min)	24	24	24	24
C5	Cost margin	20%	20%	20%	20%
C6	% Streams contribution	25%	25%	25%	25%
C7	Business impact per min	\$25,000	\$25,000	\$25,000	\$25,000
Ct	Faster response times		\$2,025,000	\$2,700,000	\$3,600,000
	Risk adjustment	↓2%			
Ctr	Faster response times (risk-adjusted)		\$1,984,500	\$2,646,000	\$3,528,000

Flexibility

The value of flexibility is clearly unique to each customer, and the measure of its value varies from organization to organization. There are multiple scenarios in which a customer might choose to implement Streams and later realize additional uses and business opportunities, including:

- › Ability to integrate different data sources in the data analysis platform.
- › Ability to scale to other application use cases.

Flexibility would also be quantified when evaluated as part of a specific project (described in more detail in Appendix A).



Perishability of data forced the organization to look to a real-time streaming platform.

Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could be turned into business benefit for a future additional investment. This provides an organization with the "right" or the ability to engage in future initiatives but not the obligation to do so.

Total Costs

REF.	COST	INITIAL	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Dtr	License and maintenance	\$1,050,004	\$0	\$210,001	\$210,001	\$1,470,005	\$1,381,335
Etr	POC and implementation	\$840,000	\$0	\$0	\$0	\$840,000	\$840,000
Ftr	Ongoing training, administration, and development	\$0	\$480,000	\$495,000	\$499,200	\$1,474,200	\$1,220,511
	Total costs (risk-adjusted)	\$1,890,004	\$480,000	\$705,001	\$709,201	\$3,784,205	\$3,441,846

Streams Costs

The total investment costs of the IBM Streams solution are based on three separate cost areas:

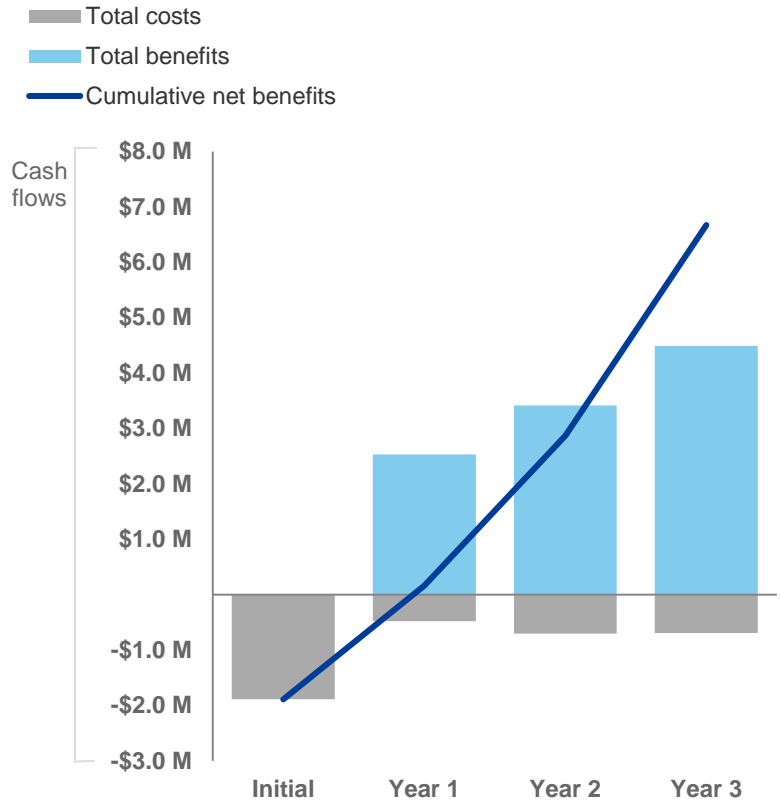
- › **License and maintenance.** The upfront and recurring costs for the Streams software solution. Streams is priced per CPU.
- › **Implementation.** Internal costs to perform and vendor proof of concept, testing, and initial implementation of the Streams solution.
- › **Ongoing administration.** Annual recurring costs associated with managing the Streams solution, training associated with the new platform (incurred in Year 2), and development costs in repurposing the legacy applications to the new Streams environment.

The table above shows the total of all costs across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the interviewed organization expects risk-adjusted total costs to be a PV of more than \$3.4 million.

Financial Summary

CONSOLIDATED THREE-YEAR RISK-ADJUSTED METRICS

Cash Flow Chart (Risk-Adjusted)



The financial results calculated in the Benefits and Costs sections can be used to determine the ROI, NPV, and payback period for the interviewed organization's investment. Forrester assumes a yearly discount rate of 10% for this analysis.



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

Cash Flow Table (Risk-Adjusted)

	INITIAL	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Total costs	(\$1,890,004)	(\$480,000)	(\$705,001)	(\$709,201)	(\$3,784,205)	(\$3,441,846)
Total benefits	\$0	\$2,533,125	\$3,486,750	\$4,561,125	\$10,581,000	\$8,611,293
Net benefits	(\$1,890,004)	\$2,053,125	\$2,781,749	\$3,851,924	\$6,796,795	\$5,169,448
ROI						150%
Payback period						11.0

IBM Streams: Overview

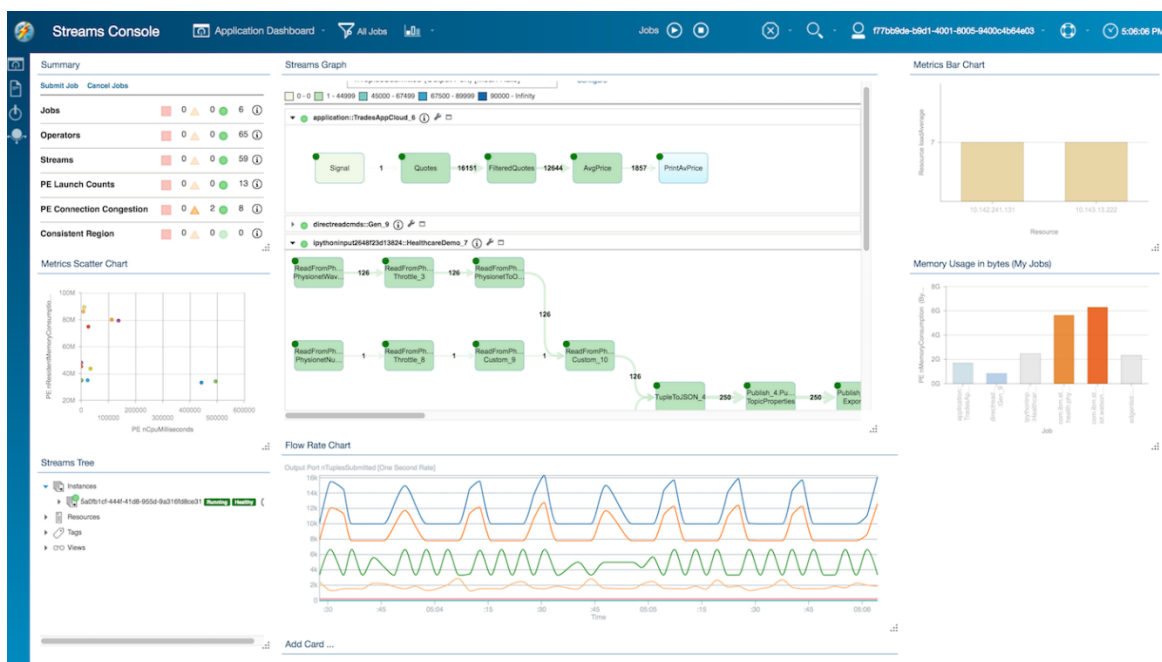
The following information is provided by IBM. Forrester has not validated any claims and does not endorse IBM or its offerings.

IBM Streams analyzes the broadest range of streaming data, making decisions while events are happening. It brings meaning to fast-moving data streams and helps organizations in a wide variety of industries. Now organizations can subscribe to device data to provide advanced analytics using Streams with internet-of-things (IoT) platform capabilities.

A key component of the IBM Watson Data Platform, Streams offers a computing platform that helps organizations turn burgeoning, fast-moving volumes and varieties of data into insight. It delivers a programming language and an integrated development environment (IDE) for applications, a runtime system that executes the applications on a single host or a distributed set of hosts, and analytic toolkits to help speed development. You can use Java and Python to develop applications for deployment to the runtime. Streams can ingest, filter, analyze, and correlate massive volumes of continuous data streams.

These data streams can originate from any of the following:

- IoT devices and sensors.
- Text files, spreadsheets, images, video, and audio recordings.
- Email, chat, and instant messaging; web traffic, blogs, and social networking sites.
- Financial transactions, customer service records, telephone usage records, and system and application logs.
- Satellite data, GPS data, smart devices, sensors, network traffic, and messages.



Appendix A: Total Economic Impact

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

Total Economic Impact Approach



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



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



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



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

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



PRESENT VALUE (PV)

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



NET PRESENT VALUE (NPV)

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



RETURN ON INVESTMENT (ROI)

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



DISCOUNT RATE

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



PAYBACK PERIOD

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

Appendix B: Supplemental Material

Related Forrester Research

“Perishable Insights — Stop Wasting Money On Unactionable Analytics,” Forrester Research, Inc., August 11, 2016.

Online Resources

More information about IBM Streams is available at www.ibm.com/streams.