A Forrester Total Economic Impact™ Study

Commissioned By

IBM

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October 2014

The Total Economic Impact™ Of IBM's Information Management Solutions

An Analysis Examining The Value Of IBM's Big Data Management Solutions

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Executive Summary

As big data initiatives become less of an abstract thought and more of a concrete reality, businesses are focusing on how they can leverage big data solutions to solve their real business problems. IBM commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by leveraging IBM Information Management solutions focusing on big data within their environment. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of solving important business problems through leveraging IBM Information Management solutions. Forrester focused on three specific big data use cases IBM has developed to help its customers solve important business problems:

- **Enhanced 360-Degree View Of The Customer:** The purpose of this use case is to extend existing customer views by incorporating additional internal and external information sources and gaining a more complete understanding of customers.
- **Security and Intelligence Extension:** This use case looks to create enhanced intelligence and surveillance insight to prevent, predict, and mitigate cyberattacks and physical attacks in real time.
- **Data Warehouse Modernization:** This use case focuses on the modernization of the data warehouse with new technology, including in-memory computing, Hadoop, appliances, social data, telematics, and the internet of things, while building confidence in existing data

Each of these use cases is supported by specific IBM Information Management solutions. For a full listing of the IBM products and solutions that support each use case, please see Appendix A. This study illustrates the value that organizations see by increasing tool adoption and standardizing on a common IBM tool set to manage their big data problems. Note that these use cases are not meant to be in a prioritized or sequential order. Forrester encourages readers to identify which use cases make the most sense for their organization given the challenges they face.

To better understand the benefits, costs, and risks associated with these three use cases, Forrester interviewed existing IBM customers standardizing on IBM's Information Management solutions, focusing on big data use cases to help leverage advanced analytics and improve business processes and strategic decision-making. Forrester also conducted an online survey of 379 global line-of-business and IT professionals involved in big data management strategy to better understand the current market impact, attitudes, and behaviors with regard to the big data management market space.

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

ROI: 148%	Total benefits (present value): $31,213,638

Source: Forrester Research, Inc.

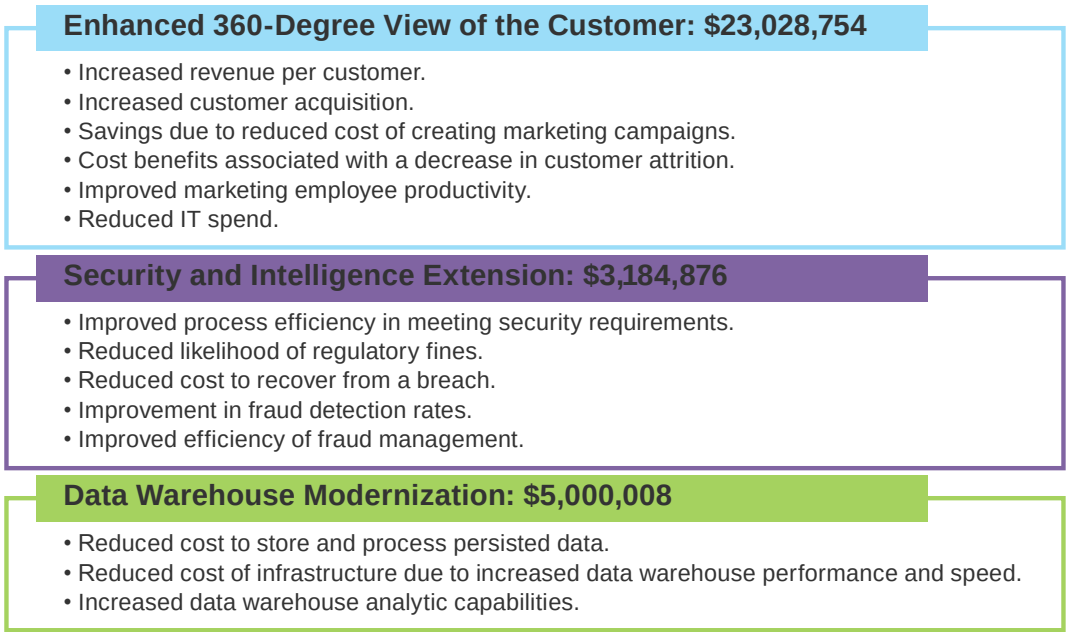
Prior to investing in IBM's Information Management solutions, customers had worked with multiple vendors and ad hoc applications to support their business needs in regards to customer understanding, security and fraud, and the data warehouse. However, these organizations felt they lacked the tools and capabilities to fully leverage structured, unstructured, and streaming data sources across their individual business units, and felt they were not taking advantage of new technologies and modern approaches to get the most out of their data environments. The existing information management tools were siloed and ad hoc without a coherent information management strategy for big data opportunities. With the

implementation of IBM's Information Management solutions, customers were able to create visibility into their data and introduce real-time analytic capabilities to meet their business objectives.

Our interviews with six existing customers, our online survey of 379 organizations across the globe, and subsequent financial analysis found that a representative, composite organization based on these interviewed and surveyed organizations experienced the risk-adjusted ROI, benefits, and costs for the three targeted use cases shown in Figure 1.[1] See Appendix A for a description of the composite organization.

› **Benefits.** A composite organization experienced the risk-adjusted benefits for each use case shown in Figure 2 from its investment in an Information Management solution from IBM.

FIGURE 2
Benefits Summary And Five-Year Risk-Adjusted Present Value Results



Source: Forrester Research, Inc.

› **Costs.** The composite organization experienced the following risk-adjusted costs, encompassing all three use cases:

- Software costs.
- Hardware costs associated with additional software.
- Planning and implementation.
- Costs associated with professional services, internal support, and change management.

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's Information Management solutions.
- 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. Survey responses were sourced by Forrester and include responses from the United States, Brazil, France, Germany, China, and India.

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/Big Data Management Solutions. 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/Big Data Management Solutions can have on an organization (see Figure 3). Specifically, we:

- Interviewed IBM marketing, sales, and/or consulting personnel, along with Forrester analysts, to gather data relative to IBM's Information Management Solutions and the marketplace for information management solutions.
- Interviewed eight organizations currently using IBM/Big Data Management Solutions to obtain data with respect to costs, benefits, and risks.
- Conducted an online survey of 379 organizations in the US, Brazil, Western Europe, China, and India to evaluate their big data management strategies in our three specific use cases. Survey participants included line-of-business and IT professionals who make, influence, or have knowledge around decisions related to big data management strategy from firms with 500 or more employees. The study was conducted in July 2014.
- Designed a composite organization based on characteristics of the interviewed organizations (see Appendix B).
- Constructed a financial model representative of the interviews and online survey using the TEI methodology. The financial model is populated with the cost and benefit data obtained from the interviews and online survey as applied to the composite organization.
- Risk-adjusted the financial model based on issues and concerns the interviewed organizations highlighted in interviews. Risk adjustment is a key part of the TEI methodology. While interviewed organizations provided cost and benefit estimates, some categories included a broad range of responses or had a number of outside forces that might have 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/Big Data Management Solutions' 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 C for additional information on the TEI methodology.

FIGURE 3
TEI Approach

Source: Forrester Research, Inc.

Market Overview

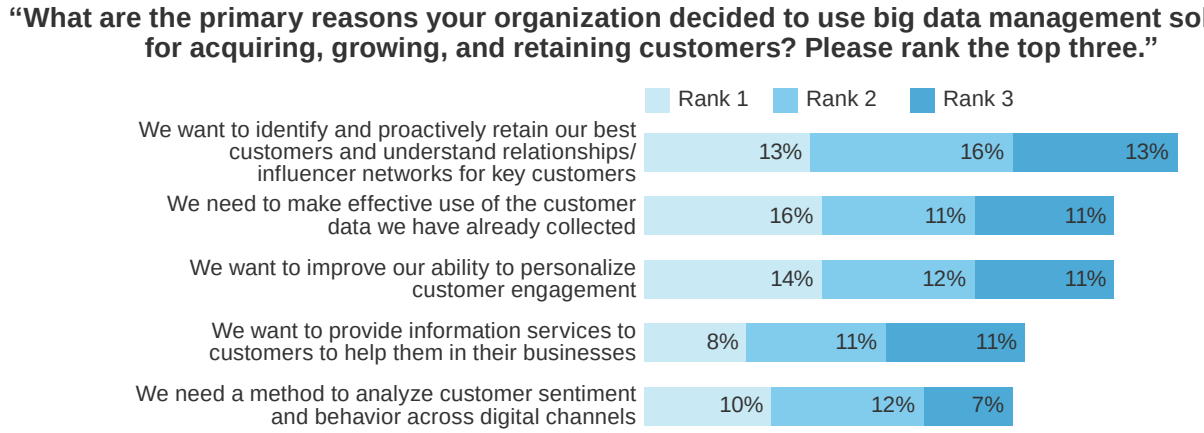
THE CURRENT STATE OF INFORMATION MANAGEMENT IN THE MARKETPLACE

In order to better understand the current state of information management solutions, with a particular focus on big data initiatives, Forrester conducted an online survey of 379 organizations in the US, Brazil, Western Europe, China, and India to evaluate their attitudes and feelings related to the three specific use cases. The study focused on organizations' behavior and their attitudes toward the use of information management systems for their big data strategy as it pertains to understanding of the customer, enterprise security and intelligence, and modernization of the data warehouse. From the survey, we discovered:

Enhanced 360-Degree View Of The Customer

- **The need to identify and proactively retain the best customers is a key reason organizations use the 360-Degree View Of The Customer use case.** When asked what was the primary reason their organization decided to use information management systems to support big data use cases for acquiring, growing, and retaining customers, 42% of respondents highlighted the need to both understand who the best customers are and what makes them satisfied customers as key drivers for this use case. Along with understanding the customer, they also want to be able to understand the relationships and influencer networks for these key customers. Organizations also identified that they need to make effective use of the customer data they already have access to (38%), as well as be better able to improve the personalization of customer engagement (37%). These and other drivers are highlighted in Figure 4.

FIGURE 4
Top Five Drivers For Enhanced 360-Degree View Of The Customer Use Case



Base: 312 360-Degree View Of The Customer decision-makers

Source: Forrester Research, Inc.

- **Increasing the revenue per customer is a key metric when measuring the success of these initiatives.** Seventy-six percent of respondents stated that when their organizations want to improve the value of a customer, they want to be able to see an increase in revenue per customer to prove these initiatives have been a success. Sixty-nine percent of organizations also reported that they look to increased customer acquisition, and 54% look for an improved speed in acquiring new customers as a measurement of success.

› **Driving improved employee efficiency is also crucial to the success of a big data initiative focusing on the customer.** The surveyed organizations also identified that these initiatives are successful when they improve the internal processes of the organization. Specifically, 73% of respondents look to make employees more efficient, 66% hope to reduce the cost to reach the customer, and 48% want to reduce the cost of making these initiatives work.

Security and Intelligence Extension

› **Organizations want to be more proactive with their security measures.** When we looked at why organizations used information management systems to support big data projects focused on maintaining and improving enterprise security, over 60% of organizations stated that they wish to be more proactive with their security measures. We also heard from 58% of organizations that they want a more cost-effective solution than their current enterprise security solutions. Fifty-seven percent of organizations told us they are also facing new regulations and compliance requirements that mean they need to update how their organizations handle security. These and other drivers are highlighted in Figure 5.

FIGURE 5
Top Five Drivers For Security and Intelligence Extension Use Case

Base: 315 Security and Intelligence Extension decision-makers

Source: Forrester Research, Inc.

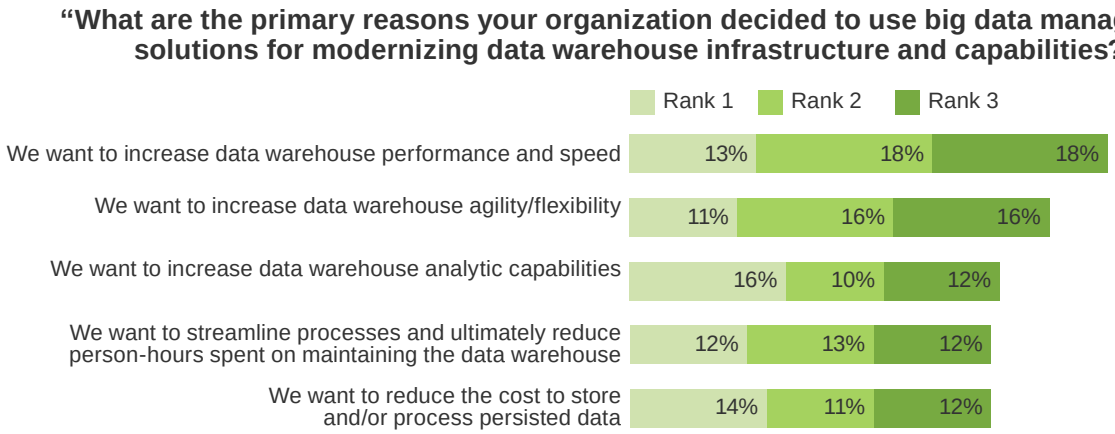
› **Improving the process efficiency of security measures is key to the success of organizations' big data initiatives.** When asked how they measure the success of their big data initiatives for their enterprise security, an overwhelming 82% of organizations spoke of the need to improve the process efficiency of meeting the new regulations and compliance requirements these organizations face. Forty-four percent of organizations also measure success through their ability to reduce the likelihood of being hit with regulatory fines and penalties from inadequate security measures at their company. Additionally, 41% of companies also focus on the reduction in fines they actually needed to pay by using a big data initiative for their enterprise security.

Data Warehouse Modernization

› **Organizations are driven to increase the performance and speed of their data warehouse.** With the increase in the amount and variety of data that the warehouse infrastructure is being asked to handle, nearly half of organizations reported that they feel the need to increase the performance and speed of their data warehouse to provide the business the ability to create better business insights. Along with better performance and speed, 43% of organizations also want to create a more agile and flexible data warehouse to optimize the warehouse infrastructure and ultimately save money.

› **Increasing the analytic capabilities of the data warehouse creates more value for the business.** A critical driver for over a third of our surveyed organizations using big data technology to improve the warehouse is to create more value for the business through advances in analytic capabilities. With so many new data sources, organizations need to prepare the data from all these sources so they can use it to strengthen their analytic capabilities to ensure the business can take advantage of the new insights this data creates. Figure 6 below illustrates these drivers.

FIGURE 6
Top Five Drivers For Data Warehouse Modernization Use Case



Base: 327 Data Warehouse Modernization decision-makers

Source: Forrester Research, Inc.

Analysis

COMPOSITE ORGANIZATION

For this study, Forrester conducted a broad market survey of 379 organizations across the globe as well as a total of six interviews with representatives from the following companies, which are using IBM tools to support our three main big data use cases:

- A European-based government agency.
- A US-based health insurance provider.
- Two US-based insurance and financial services organizations.
- Two European-based financial services organizations.

Based on the interviews and supported by the survey data, Forrester constructed a TEI framework, a composite company, and an associated ROI analysis that illustrates the areas financially affected from an investment in big data initiatives. The composite organization that Forrester synthesized from these results represents an organization with the following characteristics:

- A US-based financial organization with offices worldwide, offering retail financial products like credit cards, personal banking accounts, and loans.
- 88,000 employees worldwide.
- A total annual revenue of $40 billion.
- 28 million customers worldwide.

After researching a number of solutions and partners, the composite organization chose to work with IBM for its big data initiatives.

> *"Success will be being able to appropriately manage and take advantage of these incoming data sets and pivot that into business value."*
>
> ~A US-based insurance and financial services organization

Similar to our interviewed organizations, the composite organization faced an enormous amount of complex, detailed data coming from a variety of sources, and it was having difficulty finding a way to not only process the data, but be able to use it in a way that would support the different initiatives of the organization. Prior to the investment, the composite organization was using multiple vendors and ad hoc applications to support its business needs in regards to customer understanding, security and fraud, and the data warehouse. The goal of the overall big data project was to increase the maturity, visibility, and access to data in these three use cases. The primary driver for the organization was to better leverage its data and support the business initiatives across the three key use cases outlined below. This is part of the organization's strategy around being able to better leverage big data opportunities:

- Realizing the complexity of the work required, the representative organization saw this as a transformational process over five years to improve its big data capabilities. The first two years represent a rollout period, with many benefits beginning to hit in years 2 and 3, and continuing into Year 5.
- Prior to the investment, the organization felt it did not have the tools and capabilities to fully leverage both structured and unstructured data across individual business units. The existing information management tools were siloed and ad hoc without a coherent information management strategy for capitalizing on big data opportunities.

- As part of its big data initiative, our composite organization chose to focus its initial big data projects in one region of the US.
- For the purposes of this study, we will be focusing on this region. This region makes up about one-fifth of the organization's US annual revenue and supports 4.2 million customers.
- This region has an annual IT budget of $240 million, with roughly $16.8 million devoted to data management and governance.
- The goal was to use big data solutions for each of the three use cases in different areas of the company:
    - Leverage big data insights to acquire, grow, and retain customers through the Enhanced 360-Degree View Of The Customer use case. The representative organization used the following IBM solutions to support this use case: InfoSphere Master Data Management, IBM InfoSphere BigInsights, IBM InfoSphere Streams, IBM InfoSphere Information Server for Data Integration, IBM InfoSphere Information Server for Data Quality, and IBM Data Warehousing (DB2/Informix).
    - Use information and knowledge gained from big data in order to improve security throughout the organization with the Security and Intelligence Extension use case. In support of this use case, the composite organization used IBM QRadar Security Intelligence Platform, IBM InfoSphere BigInsights, IBM InfoSphere Streams, IBM PureData for Analytics (Netezza), IBM InfoSphere Guardium, and IBM InfoSphere Optim.
    - Optimize and update the data warehouse in order to improve performance and better support big data capabilities through the Data Warehouse Modernization use case. The IBM products used as part of this initiative include IBM InfoSphere BigInsights, IBM InfoSphere Streams, IBM Watson Explorer IBM's information, IBM PureData for Analytics, IBM Data Warehousing (DB2/Informix), IBM DB2 with BLU Acceleration, IBM InfoSphere Information Server, and other InfoSphere information integration and governance (IIG) offerings.

INTERVIEW HIGHLIGHTS

Along with the online survey, the findings from the interviews were the primary driver for the analysis. While the business challenges our organizations faced varied, several common themes were uncovered across our interviews.

The interviews revealed a common number of drivers for why companies needed to invest in information management solutions to meet their big data initiatives:

- **There is a greater variety and complexity of structured and unstructured data available to the organizations than ever before.** In each of our interviews, the organizations discussed the amount of structured and unstructured data that they are faced with at their company. As one organization discussed: "We offer a wide variety of services, and we have more than 150 different line[s]-of-business applications, and they all have data we need on them. And they are all sort of distinct functional systems that do particular things; we need all that data."

  The organizations understood that this data was crucial to their success, but they realized that they lacked the ability internally to make sense of it and turn it into valuable data. "For instance, a traditional DBMS doesn't lend itself to the huge amount of unstructured data that we are beginning to deal with. Success

> *"And if people had the visibility into the full picture, they would realize that the risk to a particular [client] was much higher than in their own particular perspective of the data."*
>
> ~A European-based government agency discussing the importance of having complete visibility into the available data

will be being able to appropriately manage and take advantage of these incoming data sets and pivot that into business value." They understood that getting this data into a solution that would help them become more successful was key for them to remain competitive in their various industries.

- **They needed visibility into their existing data to build out the best business insights.** From our interviews, we heard over and over again that organizations want better visibility into their distinct data sources. The organizations are looking for ways to pull valuable insights from these sources to help them make the best business decisions for their companies. We heard from these organizations that, prior to their investments, they lacked visibility into these different data sources, and it hurt their abilities to make real-time business decisions.

  As a Forrester analyst discussed, "Customer information is typically distributed not only across various product-specific applications and data stores but also across fragmented channel solutions."[2] One of our interviews discussed how lack of visibility into the company's data not only creates issues for creating value for the company, but also introduces the dangers of poor data quality and data governance: "The way our data was organized, people only know where to find a small amount of the data they could actually have access to. If they start looking at all these different data environments and people are changing data in one place, and not in others . . . you start losing the visibility into what's happening." In another interview, an organization focused on providing governmental services summed up the need for better visibility into existing data well: "One of the things that has been a real driver to getting technology was the issue that different services working with a [client] didn't know what other services were involved, and there was a breakdown in terms of communication. And if people had the visibility into the full picture, they would realize that the risk to a particular [client] was much higher than in their own particular perspective of the data."

> *"The way IBM's products are sold as a suite and designed to work together — that brings major value to us."*
>
> ~A US-based health insurance provider

- **Organizations require real-time business insights to stay competitively ahead.** Another main driver that came up for many organizations, regardless of the specific business challenge they faced, was the need for real-time analytics to support their business decisions. One organization, focusing on their enterprise security and intelligence needs, said to us: "We need a way to monitor database activity and monitor who is accessing and using our most sensitive data. While we did have some homegrown programs out there that could report on this, we found that we could not get that information in real time, and we needed some better tools or capabilities in order to monitor that activity in real time and do it more efficiently." While in this case, unwarranted access and data breaches were at stake, regardless of the challenge these organizations faced, they understood that real-time business insights could help them make better business decisions to improve customer satisfaction, improve enterprise security, and understand how to optimize their warehouse.

- **Addressing their big data business challenges was often about protecting their brand perception.** The interviewed organizations mentioned a variety of ways that addressing their big data business challenges helped them to protect their brand, whether it was creating better, more targeted marketing campaigns that, in turn, improve customer satisfaction, or building out the security of an organization. For example, using big data insights can bring a competitive advantage to banks and financial service companies, providing them with insights to create better products and provide higher levels of customer service.[3] This can be applied to a variety of industries, all of which can use big data insights to become more customer-focused and competitive in their specific markets. For many organizations, big data provided them with a more secure enterprise, allowing them to prove to their customers how they were, in turn, protecting them. As one organization told us "Telling our customers about our security measures, people have a good feeling for our company because they know we are going in-depth for security. Security is a very hot topic among our customers, and we are able to take a strong position on security."

Our interviews uncovered that IBM's Information Management solutions were selected to help our interviewed organizations with their big data initiatives, not only because IBM helped these organizations with their above goals, but also due to IBM's reputation as a solid partner. In addition, IBM's Information Management solutions helped these organizations realize additional benefits due to IBM's ability to support and solve multiple big data challenges and use cases, as well as how well IBM's tools work together to support business goals.

The interviews revealed that IBM's Information Management solutions were selected because:

- **IBM has a reputation as a solid partner, with easy-to-use products.** For each of our organizations, their investments to meet their big data initiatives were seen as long-term investments. Our interviewees discussed that they were comfortable moving forward with IBM due to its reputation as a strong partner and its ability to understand the variety of business challenges these organizations are faced with. One organization said: "We have a great relationship with IBM. From an IT perspective, they understood our needs, and their capabilities were able to fill in the gaps in our environment." Another organization shared with us: "I think our environment is pretty complex — I think all organizations think their environment is complex. Having a relationship with IBM where they understand how things are done here, and they kind of know what our environment looks like, I think that definitely helped us as well." Another organization, when discussing its process to find a partner for its big data challenges, said: "We find that IBM's products are easy to use, and that's a key factor for us. Some of the other products, it's a nightmare to create rules, deploy rules, and so on — for us, that would have been such a waste of time. Working with IBM saves our time and ensures our performance remains high." Organizations also felt that working with a well-respected vendor like IBM reduced their overall risk when entering into such a long-term initiative. "On its own, just working with IBM reduces our risk by working with a respected vendor. It's assuring; we don't have to worry."

- **Investing in one big data use case opens the door to support additional use cases and do more with big data.** When an organization comes to IBM for a specific use case, it quickly finds it can apply its learnings, knowledge, and investment to support other use cases. One company we spoke with that was initially very focused on the Security and Intelligence Extension use case was able to utilize IBM's tools to do an overhaul on its data warehouse and be better able to support all areas of the company. Another organization, whose main focus was the complete 360-degree view of the customer, was able to manipulate its data in order to detect, in real time, potential fraudulent activities. "We have all these different silos of data that are robust on their own, but they sit separate. Bringing all this data together brings us more value. Our data teaches us about our customer; it also exposes all kinds of risk and exposure considerations that will boggle the mind, where we can go with this data. Fraud protection is a big one." For another organization, this reason alone was the main selling point to invest in the technology: "Initially we did not have the budget for this. But then, when you start to combine this with other areas of the company that can use this data, particularly in debt collection and fraud, the business case for bringing all of the customer data together [with these solutions] was quite stacked."

- **Organizations found using multiple IBM products together to be the best way to support business goals.** A key benefit of working with IBM that the organizations discussed was the value of the IBM products when the tools are working together. Our organizations found that they were able to do more to meet their big data challenges by creating a solution from IBM's portfolio of products. According to one organization: "When selecting a vendor, I think one of the things to consider is the way that IBM's products work together. I think the way IBM's products are sold as a suite and designed to work together, that brings major value to us. It's not just about picking the one singular best product, but understanding how those products integrate together and add more value." One organization told of us of its struggle with multiple vendors and how it found the best solution to its problem through an investment in IBM: "We are looking for something that we can deal with large amounts of data, deal both analytically and transactionally, and is at the same time easy to roll out insights and integrate with business processes — that's where we need to be. If we throw this on [different tools], well, it doesn't quite meet the analytical side, or it doesn't meet the nonfunctional requirements. We need multiple tools to work together." One organization summed up nicely why it found IBM to be the best fit for its big data challenges: "Because of the best of suite point-of-view, the interoperability, the integration capabilities, and the benefits of partnering with IBM, they are certainly the top vendor for us."

BENEFITS

The composite organization experienced a number of quantified benefits in this case study. Benefits were seen across three business initiatives, as follows:

Enhanced 360-Degree View Of The Customer

- Increased revenue per customer.
- Increase customer acquisition.
- Savings due to reduced cost of creating marketing campaigns.
- Cost benefits associated with a decrease in customer attrition.
- Improved marketing employee productivity.
- Reduced IT spend.

Security and Intelligence Extension

- Improved process efficiency in meeting security requirements.
- Reduced likelihood of regulatory fines.
- Reduced cost to recover from a breach.
- Improvement in fraud detection rates.
- Improved efficiency on fraud management.

Data Warehouse Modernization

- Reduced cost to store and process persisted data.
- Reduced cost of infrastructure due to increased data warehouse performance and speed.
- Increased data warehouse analytic capabilities.

Across each of these use cases, another important benefit uncovered was an increase in both customer satisfaction and employee satisfaction. While customer and employee satisfaction depend on a number of factors, the impact of these improvements should be considered when considering a big data management project.

Note that these use cases are not meant to be in a prioritized or sequential order. Forrester encourages readers to identify which use cases make the most sense for their organization given the challenges they face.

Enhanced 360-Degree View Of The Customer

Many banks understand big data's "vital role in winning and retaining customers"[4]; the interviews with IBM's clients unveiled that this is very accurate. Organizations understand the importance of how a clearer view into customer analytics empowers them to make smarter business decisions and ultimately improve the bottom line. Similar to our interviewed organizations and survey respondents, the composite organization implemented IBM Information Management solutions in order to leverage big data insights to better inform marketing campaigns to acquire new customers and grow and retain existing customers. The IBM products the organization used include InfoSphere Master Data Management, IBM InfoSphere BigInsights, IBM InfoSphere Streams, IBM InfoSphere Information Server for Data Integration, IBM InfoSphere Information Server for Data Quality, and IBM Data Warehousing (DB2/Informix). The composite organization experienced a number of

quantifiable benefits as part of this initiative to better leverage its data to understand customers. The risk-adjusted present value total benefit resulting from the Enhanced 360-Degree View Of The Customer use case over the five years was $23,028,754. See the section on Risks for more detail.

While this section of the study focuses on improvement for the marketing team in general, it is important to note that these insights into customer behavior have an impact on a wide variety of functional areas, from customer service to product development, and creating an enhanced single view of the customer helps the business improve how it serves customers.

Increased Revenue Per Customer

A key contributor to the measurable success of the big data initiatives is the creation of a 360-degree view of the customer. Specifically, interviewed organizations and the broader survey respondents indicated that they were using big data to increase the revenue per customer. Through its investment in IBM's Information Management solutions, the representative organization's marketing team was able to create real-time, advanced analytics from a greater variety of structured and unstructured data, allowing the creation of a single cohesive view of its customer. The marketing team was able to use these new insights in order to better understand what drives its existing customers to invest in additional retail financial products. Access to this data enabled the marketing team to enhance its marketing campaigns, creating more targeted and impactful materials that resonate better with buyers. The result is an increase in the revenue earned per existing customer.

The composite organization has roughly 4.2 million customers in the region where it rolled out this initiative. That number increases by an average of 5% year over year. However, only a certain number of those customers are affected by this big data project, increasing to 15% of the total customers over a five-year period. The average yearly value of an existing customer is $1,800, with a gross margin of 13%.

As use of IBM's Information Management solutions matures, the marketing team is able to gradually improve its use of the data available, creating better marketing materials that, in turn, improve the percentage increase of revenue per customer. Over a five-year period, the composite organization uses the new insights created by advanced analytics to increase its revenue per customer to 7.5% by Year 5. Table 1 shows this benefit in each of the five years of analysis.

Interviewed organizations provided a broad range of revenue improvements, since there are a variety of outside forces that might also affect this. To compensate, this benefit was risk-adjusted and reduced by 10%. The risk-adjusted total benefit resulting from increased revenue per customer over the five years was $$21,361,217. See the section on Risks for more detail.

TABLE 1
Increased Revenue Per Customer

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Year 4	Year 5
A1	Number of existing customers in targeted region		4,200,000	4,410,000	4,630,500	4,862,025	5,105,126
A2	Percent growth of customers YOY (average)		5%	5%	5%	5%	5%
A3	Percentage of customers affected by big data project		0%	3%	5%	10%	15%
A4	Total big data project customers	A1 * A3	0	132,300	231,525	486,203	765,769
A5	Average yearly value of existing customer		$1,800	$1,800	$1,800	$1,935	$2,080
A6	Percentage increase of revenue per customer due to big data project		0.0%	1.5%	3.0%	5.0%	7.5%
A7	Gross margin		13%	13%	13%	13%	13%
At	Increased revenue per customer	A4 * A5 * A6 * A7	$0	$464,373	$1,625,306	$6,115,212	$15,529,794
	Risk adjustment	↓10%					
Atr	Increased revenue per customer (risk-adjusted)		$0	$417,936	$1,462,775	$5,503,691	$13,976,815

Source: Forrester Research, Inc.

Increase Customer Acquisition

Along with gaining a better understanding of the representative organization's existing customers, the investment in IBM Information Management solutions creates analytics that help the marketing team learn how to better target new customers. The investment allows the representative organization to mine the existing information on customers, as well as access new sources of information, to create insights into how best to engage with new customers and develop a trusted relationship with prospective clients.

Through its focus on improving how it targets and engages with prospective customers, the composite organization was able to gradually increase the percentage of new customers acquired due to the big data project, leading to a percentage increase of 7.4% in customer acquisition by Year 5. Table 2 illustrates how this was calculated, with the number of customers per year, average yearly value of new customers ($1,000), and gross margin (13%).

As with the existing customers, Forrester understands that many variables can affect the precise percentage increase in new customers. As such, Forrester risk-adjusted the value of this benefit down by 5% to reflect this uncertainty.

TABLE 2
Increase Customer Acquisition

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Year 4	Year 5
B1	Total number of customers affected by big data project	A4	0	132,300	231,525	486,203	765,769
B2	Percentage increase in customer acquisition		0.0%	2.5%	4.0%	5.9%	7.4%
B3	Number of new customers per year	B1 * B2	0	3,308	9,261	28,686	56,667
B4	Average yearly value of new customer		1,000	1,000	1,000	1,000	1,000
B5	Gross margin		13%	13%	13%	13%	13%
Bt	Increased customer acquisition	B3 * B4 * B5	$0	$429,975	$1,203,930	$3,729,173	$7,366,697
	Risk adjustment	↓5%					
Btr	Increased customer acquisition (risk-adjusted)		$0	$408,476	$1,143,734	$3,542,715	$6,998,362

Source: Forrester Research, Inc.

Savings Due To Reduced Cost Of Creating Marketing Campaigns

Additionally, the investment in IBM's Information Management solutions helps reduce the cost of targeting and acquiring customer data, in turn reducing the cost of creating marketing campaigns. With better data access, the marketing team finds it easier to gather this information, helping to bring down the cost of an overall campaign. While we did not specifically quantify this benefit, with faster access to better data, the investment can also help speed up the time it takes to create these campaigns and reduce the cost to reach out to a customer.

To calculate the reduction in cost of creating marketing campaigns, we estimate that the target region spends over $5.5 million on each campaign it runs, including data acquisition, labor, and campaign promotion. To create a conservative analysis, Forrester specifically looked at the part of the budget that was focused on gathering data for targeting and acquiring customers. Forrester applied industry knowledge and information collected from interviewees to determine that about 15% of the campaign budget is for targeting and acquiring data.

As time goes by, the marketing team becomes increasingly proficient with targeting and acquiring data, and the percentage reduction in campaign cost increases as the team is able to build additional insights that create more opportunity to decrease the cost. By Year 5, there is a 6.2% reduction in campaign costs due to the big data initiative. Additionally, the number of campaigns that can use this data increases as the marketing team becomes more proficient and comfortable with the analytics; in Year 5, the team has an impact on four campaigns a year with its big data initiative. Table 3 highlights how this was calculated.

As we have seen, there are a number of factors that could affect the percent reduction in campaign costs. To compensate for these variations, Forrester has reduced the value of this benefit by 5%. For more on risk adjustments, please see the section on Risks.

TABLE 3
Savings Due To Reduced Cost Of Creating Marketing Campaigns

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Year 4	Year 5
C1	Total number of marketing campaigns per year		16	16	16	16	16
C2	Total marketing budget in region	1.5% of total revenue	90,000,000	90,000,000	90,000,000	90,000,000	90,000,000
C3	Total cost per marketing campaign	C2 / C1	5,625,000	5,625,000	5,625,000	5,625,000	5,625,000
C4	Percent of campaign budget for targeting and acquiring customer data (big data project)		15%	15%	15%	15%	15%
C5	Percentage reduction in campaign cost due to big data project		0.0%	1.5%	3.0%	4.5%	6.2%
C6	Number of big data-based campaigns per year		1	1	2	3	4
Ct	Savings due to reduced cost of creating marketing campaigns	C3 * C4 * C5 * C6	$0	$12,656	$50,625	$113,906	$209,250
	Risk adjustment	↓5%					
Ctr	Savings due to reduced cost of creating marketing campaigns (risk-adjusted)		$0	$12,023	$48,094	$108,211	$198,788

Source: Forrester Research, Inc.

Cost Benefits Associated With A Decrease In Customer Attrition

The investment in IBM's Information Management solutions to create a more holistic view of its customers has enabled the representative organization to better understand what motivates the customers. It has enabled the organization to improve its offerings and customer service and achieve more positive outcomes with clients. Because the organization is better able to understand customers from advanced analytics and new customer insights it is able to create, our representative organization has seen a decrease in the customer attrition rate.

Prior to its investment with IBM, the representative organization had a customer attrition rate of 3%; through its focus on improving its understanding of the customer through its big data initiative, the representative organization was able to decrease the attrition rate by 0.5% after the five-year period. There are many reasons why a customer may leave a banking institution; to compensate for this factor, Forrester estimates that about 30% of that decrease in customer attrition is

attributable to the big data initiative, based on our interviews. Figuring in the average yearly value of an existing customer and the gross margin, Table 4 shows this benefit in each of the five years of analysis.

Interviewed organizations highlighted that there are a variety of outside forces that could affect customer attrition. To compensate, this benefit was risk-adjusted and reduced by 5%. The risk-adjusted total benefit resulting from a decrease in customer attrition over the five years was $401,508. See the section on Risks for more detail.

TABLE 4
Cost Benefits Associated With A Decrease In Customer Attrition

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Year 4	Year 5
D1	Total number of customers affected by big data project	A4	0	132,300	231,525	486,203	765,769
D2	Decrease in attrition rate		0.0%	0.0%	0.13%	0.25%	0.50%
D3	Average yearly value of an existing customer		$1,800	$1,800	$1,800	$1,935	$2,080
D4	Gross margin		13%	13%	13%	13%	13%
D5	Percentage of decrease that is attributable to big data project		30%	30%	30%	30%	30%
Dt	Cost benefits of decrease in customer attrition	D1 * D2 * D3 * D4 * D5	$0	$0	$20,316	$91,728	$310,596
	Risk adjustment	↓5%					
Dtr	Cost benefits of decrease in customer attrition (risk-adjusted)		$0	$0	$19,301	$87,142	$295,066

Source: Forrester Research, Inc.

Improved Marketing Employee Productivity

Due to the use of IBM's information management solutions, the composite organization was able to gain overall efficiency from its marketing users. The faster delivery of the analytics meant that the marketing team spent less time waiting for information and could now more quickly apply these insights to day-to-day activities, making the team more productive overall.

We estimated that the number of marketing employees benefiting from the big data initiative begins at five employees in Year 1, and as the initiative rolls out to more people, increases to 30 marketing employees by Year 5. As we've seen in other benefits, over time the employees are able to more efficiently utilize the analytics and insights from the big data initiative, and we see that the productivity of these employees improves year over year. Based on feedback from the interviewed organizations and the overall online study, Forrester conservatively estimates that the productivity savings will be 7% by the end of Year 5. Forrester also adjusts productivity savings by assuming that only 50% of this time saved is used for productive work.

To compensate for the variety of adoption challenges and efficiency gains that could potentially affect this calculation, this benefit was risk-adjusted and reduced by 5%. With an assumed annual fully loaded salary of $120,000, the risk-adjusted improved efficiency of the marketing staff for our representative organization is valued at $257,070. Table 5 illustrates the calculations used.

TABLE 5
Improved Marketing Employee Productivity

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Year 4	Year 5
E1	Number of marketing employees benefiting from big data project		5	10	15	20	30
E2	Average fully loaded salary	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000
E3	Percentage productivity improvement		1.0%	3.5%	5.0%	6.3%	7.0%
E4	Percent captured		50%	50%	50%	50%	50%
Et	Improved marketing employee efficiency	E1 * E2 * E3 * E4	$3,000	$21,000	$45,000	$75,600	$126,000
	Risk adjustment	↓5%					
Etr	Improved marketing employee efficiency (risk-adjusted)		$2,850	$19,950	$42,750	$71,820	$119,700

Source: Forrester Research, Inc.

Reduced IT Spend From Supporting Unnecesary Databases

Prior to its investment in IBM's Information Management solutions for its big data project, the representative organization maintained a number of databases that held different information about its customers. Before the investment, multiple people within the organization had to access more than one database to assemble information on a customer. Now, that information is consolidated, and the organization is able to take old databases offline over time.

To calculate this benefit, Forrester assumes that old databases are taken offline slowly, ending with four total systems that are no longer supported after the five-year period. The model conservatively assumes an average running cost of $75,000. Figuring in a risk-adjustment of 1%, the reduction in IT spend from supporting unnecessary databases is $742,500 after five years. Table 6 shows these calculations.

TABLE 6
Reduced IT Spend From Supporting Unnecessary Databases

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Year 4	Year 5
F1	Number of unnecessary databases		0	1	2	3	4
F2	Average cost associated with database		$75,000	$75,000	$75,000	$75,000	$75,000
Ft	Reduced IT spend from supporting unnecessary databases	F1 * F2	$0	$75,000	$150,000	$225,000	$300,000
	Risk adjustment	↓1%					
Ftr	Reduced IT spend from supporting unnecessary databases (risk-adjusted)		$0	$74,250	$148,500	$222,750	$297,000

Source: Forrester Research, Inc.

Security and Intelligence Extension

The interviews with IBM customers uncovered how essential enterprise security is to these organizations. As one organization told us: "Our company has put a high level of importance on security, and they do recognize that we need to make this investment to protect our data. So from a business perspective, we are taking major steps to protect our data — that's our number one concern." Another organization explained: "We have more emphasis on database security and compliance these days than we did ever before; the discussion around how to create that safer, more secure company — it gets people thinking about how to build that environment."

Similar to our interviewed organizations, the composite organization implemented IBM Information Management solutions in order to utilize information and knowledge gained from big data in order to improve security throughout the organization with the Security and Intelligence Extension use case. As part of this initiative, our representative organization used the following IBM products: IBM QRadar Security Intelligence Platform, IBM InfoSphere BigInsights, IBM InfoSphere Streams, IBM PureData for Analytics (Netezza), IBM InfoSphere Guardium, and IBM InfoSphere Optim. The composite organization experienced a number of quantifiable benefits as part of this initiative to better leverage its data to improve its security. The risk-adjusted present value total benefit resulting from the Security and Intelligence Extension use case over the five years was $3,184,876. See the section on Risks for more detail.

> *"We have more emphasis on database security and compliance these days than we did ever before."*
>
> ~US-based insurance and financial services organization

As we discussed earlier, while this section is focused specifically on the financial impact of IBM's Information Management solutions in creating advanced enterprise security through big data, there are a number of nonquantified benefits around this solution to keep in mind. By improving the enterprise security through a big data initiative, companies also see an improved brand reputation, as well as more satisfied customers. When asked about how investing in IBM's Information Management solutions for security improvements affects both the organization's reputation and the customer experience, one organization told us: "It creates a good feeling for our customers

— when they join us, we tell them what we are doing with our security, and when I am talking about our IBM solutions, they are impressed. Some of our competitors had leakages, and the leaks were coming from the database itself. For our customers that are coming to us, it's really impressing for them to know how we are protecting their data." Another explained the impact it has on the organization's reputation: "It's kind of making a statement as well that we take it seriously, and do something about it. It's quite serious stuff." IBM's Information Management solutions also improve the data security and privacy of the organization's data. These are key factors when considering how an investment in enterprise security will affect your organization. Additionally, while this study focuses primarily on digital security, it is important to note that these solutions can also increase security of physical assets as well.

Improved Process Efficiency In Meeting Security Requirements

A key measure of success of the big data initiative to improve enterprise security for both the survey respondents and our interviewed organizations was the ability to improve the process efficiency in meeting security requirements. Through implementing IBM's Information Management solutions, the representative organization was able to improve its database security, auditing protocols, and reporting capability, enabling the staff to handle security requirements more quickly. Being able to audit faster and reduce the overall time spent on processes needed to meet security requirements helped enable individuals like data privacy specialists, data architects, and auditors to become more efficient and save the company money.

To calculate the improved process efficiency in meeting security requirements, we estimate that in Year 1, 10 members of the organization's staff will be affected by the big data initiative to improve security, growing to 50 members of the staff by Year 5. We assume that these employees spend an average of 20% of their time working on processes that deal with meeting the regulatory and security requirements. As time goes by, these team members become increasingly proficient with using IBM's solutions, and by Year 5, are able to reduce the time they spend on security requirements by 10%. Table 7 highlights how this was calculated.

There are a number of factors that could affect the team's ability to reduce the time it spends on security requirements. To compensate for these variations, Forrester has reduced the value of this benefit by 5%. For more on risk adjustments, please see the section on Risks.

TABLE 7
Improved Process Efficiency In Meeting Security Requirements

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Year 4	Year 5
G1	Number of staff affected by big data project		10	20	30	40	50
G2	Average annual fully loaded salary	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000
G3	Percent of time spent on security requirement processes		20%	20%	20%	20%	20%
G4	Percent reduction in time spent on security requirements		0%	3%	5%	8%	10%
Gt	Improved process efficiency in meeting security requirements	G1 * G2 * G3 * G4	$0	$14,400	$36,000	$76,800	$120,000
	Risk adjustment	↓5%					
Gtr	Improved process efficiency in meeting security requirements (risk-adjusted)		$0	$13,680	$34,200	$72,960	$114,000

Source: Forrester Research, Inc.

Reduced Likelihood Of Regulatory Fines

There is significant risk associated with getting fined by a court or other regulatory body for failure to comply with regulations. Through its investment in IBM's solutions, our representative organization has gained greater efficiency and effectiveness in its database security, auditing, and reporting capabilities that improve compliance. Due to this, the organization is able to reduce the likelihood that it will be fined.

To calculate this risk, we look at the amount of a potential fine. Forrester conservatively estimates that the organization could face a $25 million fine each year without proper measures in place to prove compliance. By investing in a big data initiative for security, the representative organization is better able to meet its security requirements and reduces the probability of a fine to 2%. The calculation is shown in Table 8.

Forrester understands that there are a number of variables that could potentially affect this calculation. To assume for that risk, we have adjusted the benefit down by 5%, for a total five-year risk-adjusted benefit of $2,375,000.

TABLE 8
Reduced Likelihood Of Regulatory Fines

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Year 4	Year 5
H1	Average potential fine		$25,000,000	$25,000,000	$25,000,000	$25,000,000	$25,000,000
H2	Probability of fine		2%	2%	2%	2%	2%
Ht	Reduced likelihood of regulatory fines	H1 * H2	$500,000	$500,000	$500,000	$500,000	$500,000
	Risk adjustment	↓5%					
Htr	Reduced likelihood of regulatory fines (risk-adjusted)		$475,000	$475,000	$475,000	$475,000	$475,000

Source: Forrester Research, Inc.

Reduced Cost To Recover From A Breach

The ability to analyze a large volume and variety of both structured and unstructured data with IBM's Information Management solutions has improved the enterprise security of the representative organization. The organization's new advanced security analytics allows it to expand its security analysis beyond the typical channels and increase the scope to analyze an enormous amount of data, in real time, to create better intelligence information. Due to this, the investment also helps the organization avoid potentially significant costs that it could incur if a data breach against its records were to occur.

We estimate that the probability of a breach is about 12% in any given year. While the actual cost of a data breach could be astronomical, Forrester conservatively estimates the average potential cost of a data breach to our representative organization to be around $2.5 million in any given year. By taking advantage of the advanced analytical capabilities IBM has created for the security organization, and analyzing a wide variety of data looking for suspicious anomalies or patterns, the organization is now able to significantly reduce the likelihood of a breach. As the security team becomes increasingly proficient in analyzing data, the likelihood of a breach becomes less likely year after year. By Year 5, the organization sees a 45% reduced likelihood of a data breach.

There are a number of outside forces that could affect the cost of a data breach or reduced likelihood of a breach; to account for this, Forrester has reduced the value of this benefit by 5%. This results in a risk-adjusted total benefit of $304,950. Table 9 shows this calculation.

TABLE 9
Reduced Cost To Recover From A Breach

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Year 4	Year 5
I1	Average data breach cost		$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000
I2	Probability of a breach		12%	12%	12%	12%	12%
I3	Reduced likelihood of a breach		0%	9%	20%	33%	45%
It	Reduced cost to recover from a breach	I1 * I2 * I3	$0	$27,000	$60,000	$99,000	$135,000
	Risk adjustment	↓5%					
Itr	Reduced cost to recover from a breach (risk-adjusted)		$0	$25,650	$57,000	$94,050	$128,250

Source: Forrester Research, Inc.

Improvement In Fraud Detection Rates

IBM's Information Management solutions enabled our representative organization to integrate big data analytic capabilities into its overall security intelligence plans. It is now able to quickly and efficiently analyze a high volume of complex data and alert the organization in real time to any threats. The investment allows the organization to predict, detect, and act on fraud proactively, instead of after it's too late.

The representative organization has specifically seen benefits in efforts to detect fraud in credit applications. With its new analytical capabilities, the organization is able to quickly identify and detect fraudulent applications. With IBM's Information Management solutions, it is now able to identify risky patterns and facts about applications, enabling it to improve its percentage of fraud detection rates.

To calculate this benefit, Forrester estimates that the representative organization receives about 5,000 credit card applications per month. Forrester applied industry knowledge and information collected from interviewees to determine the average percent of fraudulent applications to be 1.5%. With its big data initiative to improve security, the representative organization will improve the detection of these fraudulent applications by 20% in Year 5.

To compensate for the variety of challenges that could potentially affect this calculation, this benefit was risk-adjusted and reduced by 5%. Assuming an average of $1,000 for each fraudulent application, the risk-adjusted total benefit resulting from improvement in fraud detection rates over the five years was $427,500. Table 10 shows this calculation for each year. See the section on Risks for more detail.

TABLE 10
Improvement In Fraud Detection Rates

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Year 4	Year 5
J1	Number of application's processed affected by big data project	5,000 per month * 12	60,000	60,000	60,000	60,000	60,000
J2	Average percentage of fraudulent applications		1.5%	1.5%	1.5%	1.5%	1.5%
J3	Percent improvement on fraud detection rates		0%	5%	10%	15%	20%
J4	Average exposure from fraudulent application		$1,000	$1,000	$1,000	$1,000	$1,000
Jt	Improvement in fraud detection rates	J1 * J2 * J3 * J4	$0	$45,000	$90,000	$135,000	$180,000
	Risk adjustment	↓5%					
Jtr	Improvement in fraud detection rates (risk-adjusted)		$0	$42,750	$85,500	$128,250	$171,000

Source: Forrester Research, Inc.

Improved Efficiency On Fraud Management Team

In addition to savings from reducing the risk associated with enterprise security, the representative organization also noted the efficiency savings that the big data initiative brought to the fraud analysts. For instance, it took a shorter time to review applications, made it easier to gather data to uncover potential risks, and made monitoring security more efficient. The investment enabled the fraud analysts to have real-time insights to help them become more proactive in detecting fraud. Where before these tasks were time-consuming, and often slowed down by the time it took to get the necessary data, the big data initiative created a significant time savings for the organization.

To calculate this benefit, the organization estimates that in the first year, 30 fraud analysts will be affected by the big data initiative, with 80 fraud analysts being affected by Year 5. With the improvements in fraud management that the IBM investment makes for the team, the organization sees a 10% time savings in fraud management activities by Year 5. Assuming an average fully loaded annual salary of $60,000, we can calculate the total benefit from improved efficiency on the fraud management team. Table 11 illustrates the calculation used.

Interviewed organizations reported some variance in time savings, since there are a variety of outside forces that might also affect this. To compensate, this benefit was risk-adjusted and reduced by 1%. The risk-adjusted total benefit resulting from improved efficiency on the fraud management team over the five years was $1,070,685. See the section on Risks for more detail.

TABLE 11
Improved Efficiency Of Fraud Management

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Year 4	Year 5
K1	Number of fraud analysts affected by big data project			30	40	55	65	80
K2	Average annual fully loaded salary			$60,000	$60,000	$60,000	$60,000	$60,000
K3	Time savings in fraud management activities			0%	3%	6%	8.5%	10%
Kt	Improved efficiency on fraud management team	K1 * K2 * K3	$0	$0	$72,000	$198,000	$331,500	$480,000
	Risk adjustment		🡻1%					
Ktr	Improved efficiency of fraud management (risk-adjusted)		$0	$0	$71,280	$196,020	$328,185	$475,200

Source: Forrester Research, Inc.

Data Warehouse Modernization

The organizations we spoke with shared with us that modernizing their data warehouse was key to their ability to create better insights into their data. With increasing amounts of data, the warehouse has to be optimized in order to support the increased analytic capabilities the business end users need. Integrating these big data technologies into the warehouse not only enables an organization to have access to these business insights, but also optimizes the warehouse infrastructure to cost effectively store and process data as well as improve the performance and speed of the data warehouse. It also improves the quality of the data delivered to the data warehouse. Similarly, our representative organization implemented IBM Information Management solutions in order to optimize and update the data warehouse, improve performance, and better support big data capabilities through the Data Warehouse Modernization use case. The IBM products used as part of this initiative include IBM InfoSphere BigInsights, IBM InfoSphere Streams, IBM Watson Explorer, IBM PureData for Analytics and IBM Digital Analytics Accelerator (IDAA for System Z), IBM Data Warehousing (DB2/Informix), IBM DB2 with BLU Acceleration, IBM InfoSphere Information Server, and other InfoSphere IIG offerings. The risk-adjusted present value total benefit resulting from the Data Warehouse Modernization use case over the five years was $5,000,008. See the section on Risks for more detail.

Reduced Cost To Store And Process Persisted Data

One benefit of investing in modernizing its data warehouse for the composite organization was the reduced cost of processing and storing persisted data. Through its work with IBM, the composite organization was able to make use of new technologies in order to reduce these costs. For example, IBM helped the organization leverage in-memory and columnar technology that helped to boost the performance of the organization's analytic processes and increased the overall data warehouse efficiency. The organization used Hadoop in order to store queryable data, which also helped to reduce the overall costs of managing and storing data. In addition, IBM enabled the organization to use stream computing in order to achieve greater storage cost efficiency. Through investing in IBM's technologies, the composite organization was able to reduce the overall cost of managing and storing data, while maintaining an environment that supports quality of data and advanced analytic capabilities.

We estimated that in Year 1, the specific region of the composite organization that the big data project was focusing on had 300 TB of data and this data was growing at a rate of 25% each year. Based on our interviews and survey results, the model assumes that the composite organization can expect to reduce the cost of storage each year, working to a 7.1% reduction by Year 5. Assuming an average enterprise cost of storage per TB of data of $25,000, Table 12 shows how this was calculated. To account for variations that could affect this calculation, Forrester risk-adjusted the benefit down by 1%, for a risk-adjusted total benefit of $471,458 after the five-year period.

TABLE 12
Reduced Cost To Store And Process Persisted Data

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Year 4	Year 5
L1	Number of terabytes		300	375	469	586	732
L2	Number of new TBs per year		0	75	94	117	146
L3	Cost per TB	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000
L4	Percent reduction in cost of storage		0%	1%	2.8%	4.5%	7.1%
Lt	Reduced cost to store and process persisted data	L2 * L3 * L4	$0	$18,750	$65,625	$131,836	$260,010
	Risk adjustment	↓1%					
Ltr	Reduced cost to store and process persisted data (risk-adjusted)		$0	$18,563	$64,969	$130,518	$257,410

Source: Forrester Research, Inc.

Reduced Cost Of Infrastructure

In addition to reductions in storage costs, the investment in IBM to modernize the data warehouse allows the organization to realize operational and capital infrastructure savings. The investment in new technologies like in-memory technology, columnar technology, Hadoop, and stream computing provides the capability of reducing the infrastructure footprint within the data center, lowering the growth of server and networking costs within the new data center environment. While not directly quantified below, the investment also ensures that the performance and speed of the data warehouse, as well as the quality of the data in the data warehouse, are increased as well.

To calculate this benefit, we assume that 7% of the company's IT budget is focused on infrastructure operations that specifically support the data and storage environment. Based on industry averages, we assume that budget is growing by 5% each year. With the investment in IBM, the representative organization is able to reduce the infrastructure costs each year, reducing the cost by 12% in Year 5. To adjust for the variance in infrastructure costs and percent reduction, we risk-adjust the benefit down by 5%. After the five-year analysis period, the composite organization has a risk-adjusted total benefit of $2,327,938. Table 13 highlights the calculations for each year.

TABLE 13
Reduced Cost Of Infrastructure

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Year 4	Year 5
M1	Total annual revenue for Northeast		6,000,000,000				
M2	Percent of total annual revenue that makes up IT budget	4%	4%				
M3	IT budget	M1 * M2	240,000,000				
M4	Percent of IT budget that supports data and storage environment	7%	$16,800,000	$17,640,000	$18,522,000	$19,448,100	$20,420,505
M5	Percent reduction in infrastructure costs		0%	3%	6%	8%	12%
Mt	Reduced cost of infrastructure	M4 * M5	$0	$529,200	$1,111,320	$1,555,848	$2,450,461
	Risk adjustment	↓5%					
Mtr	Reduced cost of infrastructure (risk-adjusted)		$0	$502,740	$1,055,754	$1,478,056	$2,327,938

Source: Forrester Research, Inc.

Increased Efficiency From Increased Data Warehouse Analytic Capabilities

The final benefit that our organization received was the increased efficiency of the end users due to improvements at the data warehouse. With the increased analytic capabilities now possible from the data warehouse, the end users waste less time waiting for the data they need, and in turn can increase their efficiency by being able to act on analytics sooner. At the same time, the investment in modernizing the data warehouse has improved the quality of the data, meaning that end users can feel more confident in the decisions they are making. While not quantified directly here, this could also lead to better business insights that could have a significant impact on the bottom line, as well as free up time for the staff to spend more time on analysis.

To calculate this benefit, we consider the number of end users who use big data analytics; 45 end users are using big data analytics in Year 1, increasing to 160 employees by Year 5. Forrester assumes that these end users spend an average of 25% of their time on analytics. As the end users become more proficient using the tools that help them find data faster, prepare it faster, and become better at leveraging these insights, the percentage improvement rises to 20% by Year 5. To account for variations in percentage improvement, Forrester risk-adjusted this benefit down by 5%. After five years, the total risk-adjusted benefit is valued at $1,525,938. These calculations are highlighted in Table 14.

TABLE 14
Increased Efficiency From Data Warehouse Analytic Capabilities

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Year 4	Year 5
N1	Number of staff using big data analytics		45	70	100	125	160
N2	Average fully loaded annual salary		100,000	100,000	100,000	100,000	100,000
N3	Average percentage of time spent on analytics		25%	25%	25%	25%	25%
N4	Percent improvement		0%	5%	10%	15%	20%
Nt	Increased efficiency from increased data warehouse analytic capabilities	N1 * N2 * N3 * N4	$0	$87,500	$250,000	$468,750	$800,000
	Risk adjustment	↓5%					
Ntr	Increased efficiency from increased data warehouse analytic capabilities (risk-adjusted)		$0	$83,125	$237,500	$445,313	$760,000

Source: Forrester Research, Inc.

Total Benefits

Table 15 shows the total of all benefits across the benefit areas listed above, as well as present values (PVs) discounted at 10%. Over five years, the composite organization expects risk-adjusted total benefits to be a PV of more than $31 million. Table 15 also shows the subtotals for each use case individually. It is important to note that all three use cases increase efficiencies and reduce costs. In addition to the improved efficiencies and reduced costs, the Enhanced 360-Degree View of the Customer use case also enhances revenue, increasing the overall benefit.

TABLE 15
Total Benefits (Risk-Adjusted)

Benefit Category	Year 1	Year 2	Year 3	Year 4	Year 5	Total	Present Value
Enhanced 360-Degree View Of Customer Benefits							
Increased revenue per customer	$0	$417,936	$1,462,775	$5,503,691	$13,976,815	$21,361,216	$13,882,003
Increased customer acquisition	$0	$408,476	$1,143,734	$3,542,715	$6,998,362	$12,093,287	$7,962,042
Savings due to reduced cost of creating marketing campaigns	$0	$12,023	$48,094	$108,211	$198,788	$367,116	$243,411
Cost benefits of decrease in customer attrition	$0	$0	$19,301	$87,142	$295,066	$401,508	$257,233
Improved marketing employee productivity	$2,850	$19,950	$42,750	$71,820	$119,700	$257,070	$174,576
Reduced IT spend in supporting unnecessary databases	$0	$74,250	$148,500	$222,750	$297,000	$742,500	$509,489
Enhanced 360-Degree View of the Customer benefits subtotals	*$2,850*	*$932,635*	*$2,865,153*	*$9,536,328*	*$21,885,731*	*$35,222,697*	*$23,028,754*
Security and Intelligence Extension Benefits							
Improved process efficiency in meeting security requirements	$0	$13,680	$34,200	$72,960	$114,000	$234,840	$157,618
Reduced likelihood of regulatory fines	$475,000	$475,000	$475,000	$475,000	$475,000	$2,375,000	$1,800,624
Reduced cost to recover from a breach	$0	$25,650	$57,000	$94,050	$128,250	$304,950	$207,894
Improvement in fraud detection rates	$0	$42,750	$85,500	$128,250	$171,000	$427,500	$293,342
Improved efficiency of fraud management	$0	$71,280	$196,020	$328,185	$475,200	$1,070,685	$725,398
Security and Intelligence Extension benefits subtotals	*$475,000*	*$628,360*	*$847,720*	*$1,098,445*	*$1,363,450*	*$4,412,975*	*$3,184,876*
Data Warehouse Modernization Benefits							
Reduced cost to store and process persisted data	$0	$18,563	$64,969	$130,518	$257,410	$471,458	$313,129
Reduced cost of infrastructure	$0	$502,740	$1,055,754	$1,478,056	$2,327,938	$5,364,487	$3,663,689
Increased data warehouse	$0	$83,125	$237,500	$445,313	$760,000	$1,525,938	$1,023,190

analytic capabilities							
Data Warehouse Modernization benefits subtotals	*$0*	*$604,428*	*$1,358,223*	*$2,053,886*	*$3,345,347*	*$7,361,883*	*$5,000,008*
Total benefits (risk-adjusted)	**$477,850**	**$2,165,423**	**$5,071,095**	**$12,688,659**	**$26,594,528**	**$46,997,555**	**$31,213,638**

Source: Forrester Research, Inc.

COSTS

The representative organization experienced a number of costs associated with the deployment of IBM's Information Management solutions:

- Software costs.
- Hardware costs to support software investment.
- Planning and implementation costs.
- Professional services, internal support, and change management costs.

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

Total Costs

Table 16 shows the total of all costs as well as associated present values, discounted at 10%. Over five years, the composite organization expects total costs to total a net present value of a little more than $12.5 million.

TABLE 16
Total Costs (Risk-Adjusted)

Cost Category	Initial	Year 1	Year 2	Year 3	Year 4	Year 5	Total	Present Value
Software costs	$0	$438,900	$1,077,300	$877,800	$861,840	$861,840	$4,117,680	$3,072,618
Hardware	$0	$219,450	$538,650	$438,900	$430,920	$430,920	$2,058,840	$1,536,309
Planning and implementation	$2,646,000	$0	$0	$0	$0	$0	$2,646,000	$2,646,000
Professional services, internal support, and change management	$0	$762,300	$1,871,100	$1,524,600	$1,496,880	$1,496,880	$7,151,760	$5,336,652
Total costs (risk-adjusted)	$2,646,000	$1,420,650	$3,487,050	$2,841,300	$2,789,640	$2,789,640	$15,974,280	$12,591,579

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's Information Management solutions for big data 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 C).

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 information management solutions 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 information management solutions, 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 risks that affect benefits are identified as part of the analysis:

- Change management may take longer than anticipated due to the complexity of the environment.
- There may be a lower percentage of increased profit than expected.
- Productivity and efficiency savings may be lower than anticipated.

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

- The cost to implement new tools and solutions may be higher due to lack of available resources.
- The time to implement may be slower due to the delays in getting business buy-in for an enterprisewide initiative.

Table 17 shows the values used to adjust for risk and uncertainty in the cost and benefit estimates for the composite organization. Readers are urged to apply their own risk ranges based on their own degree of confidence in the cost and benefit estimates.

TABLE 17
Benefit And Cost Risk Adjustments

Enhanced 360-Degree View Of The Customer benefits	Adjustment
Increased revenue per customer	↓ 10%
Increased customer acquisition	↓ 5%
Savings due to reduced cost of creating marketing campaigns	↓ 5%
Cost benefits of decrease in customer attrition	↓ 5%
Improved marketing employee efficiency	↓ 5%
Reduced IT spend	↓ 1%

Security and Intelligence Extension benefits	Adjustment
Improved process efficiency in meeting security requirements	↓ 5%
Reduced likelihood of regulatory fines	↓ 5%
Reduced cost to recover from a breach	↓ 5%
Improvement in fraud detection rates	↓ 5%
Improved efficiency of fraud management	↓ 1%

Data Warehouse Modernization benefits	Adjustment
Reduced cost to store and process persisted data	↓ 1%
Reduced cost of infrastructure due to increased data warehouse performance and speed	↓ 5%
Increased data warehouse analytic capabilities	↓ 5%

Costs	Adjustment
Software costs	↑ 5%
Hardware costs	↑ 5%
Planning and implementation costs	↑ 10%
Professional services, internal support, and change management costs	↑ 10%

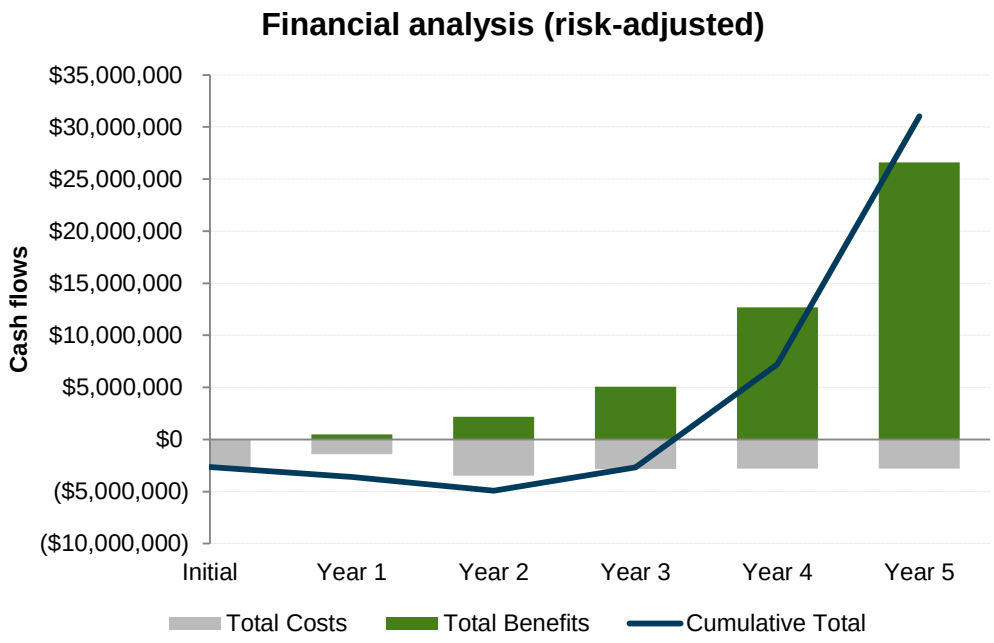
Source: Forrester Research, Inc.

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 composite organization's investment in IBM's Information Management solutions.

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 17 in the Risks section to the unadjusted results in each relevant cost and benefit section.

FIGURE 7
Cash Flow Chart (Risk-Adjusted)



Source: Forrester Research, Inc.

TABLE 18
Cash Flow (Risk-Adjusted)

Summary	Initial	Year 1	Year 2	Year 3	Year 4	Year 5	Total	Present Value
Total costs	($2,646,000)	($1,420,650)	($3,487,050)	($2,841,300)	($2,789,640)	($2,789,640)	($15,974,280)	($12,591,579)
Total benefits	$0	$477,850	$2,165,423	$5,071,095	$12,688,659	$26,594,528	$46,997,555	$31,213,638
Total	($2,646,000)	($942,800)	($1,321,627)	$2,229,795	$9,899,019	$23,804,888	$31,023,275	$18,622,059
ROI								148%
Payback period (months)								39.2

Source: Forrester Research, Inc.

IBM Information Management Solutions: Overview

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

IBM Information Management solutions deliver trusted information throughout the information supply chain and help businesses analyze their information to gain insights, identify breakdowns, and make better decisions.

Capabilities include:

- **Data management.** IBM solutions deliver industry-leading database performance across multiple workloads while lowering administration, storage, development, and server costs. The comprehensive portfolio is available:
  - As software on existing infrastructure to maximize current investments.
  - In a prebuilt system to accelerate deployment.
  - On a cloud environment for maximum flexibility.
- **Data warehousing.** IBM solutions help clients extend and evolve their data warehouse investments so they can discover deeper insights at a lower total cost of ownership. Designed to make the most of existing client solutions, integrated IBM solutions help clients quickly add next-generation database technology and appliances optimized for analytics workloads that can be up and running in hours.
- **Hadoop system.** The rich IBM Hadoop distribution brings the power of Apache Hadoop to the enterprise with application accelerators, analytics, visualization, development tools, performance, and security features — all ready to help clients manage and analyze massive volumes of structured and unstructured data.
- **Stream computing.** IBM solutions efficiently deliver real-time analytic processing on constantly changing data in motion and enable descriptive and predictive analytics to support real-time decisions. Users can capture and analyze all data, all the time, just in time. Stream computing helps organizations store less, analyze more, and make better decisions faster.
- **Information integration and governance.** IBM solutions bring together data from diverse sources for diverse targets, manage its quality, and maintain master data for multiple domains; they secure and protect data, manage it across its life cycle, and facilitate information-based collaboration across business and technical teams. These broad capabilities help organizations increase the value of data for information-intensive projects like big data analytics, application consolidation and retirement, data security and compliance, 360-degree views, and many others.

Appendix A: IBM Products And Use Cases

TABLE 19
IBM Use Cases And Product Mapping

Enhanced 360-Degree View of the Customer	Security and Intelligence Extension	Data Warehouse Modernization
InfoSphere Master Data Management	IBM QRadar Security Intelligence Platform	IBM InfoSphere BigInsights
IBM InfoSphere BigInsights	IBM InfoSphere BigInsights	IBM InfoSphere Streams
IBM InfoSphere Streams	IBM InfoSphere Streams	IBM InfoSphere Data Explorer
IBM InfoSphere Information Server for Data Integration	IBM PureData for Analytics (Netezza)	IBM InfoSphere Guardium
IBM InfoSphere Information Server for Data Quality	IBM InfoSphere Guardium	IBM InfoSphere Optim
IBM Data Warehousing (DB2/Informix)	IBM InfoSphere Optim	IBM InfoSphere Master Data Management
IBM Watson Explorer	Other IBM information, integration, and governance offerings	IBM Data Warehousing (DB2/Informix)
		IBM InfoSphere Information Server
		IBM Digital Analytics Accelerator (IDAA for System Z)

Source: Forrester Research, Inc.

Appendix B: Composite Organization Description

For this TEI study, Forrester has created a composite organization to illustrate the quantifiable benefits and costs of implementing information management solutions focusing on big data. The composite company is intended to represent a regional bank and is based on characteristics of the interviewed customers:

- A US-based financial organization with offices worldwide, offering products like credit cards, personal banking accounts, and loans.
- 88,000 employees worldwide.
- A total annual revenue worldwide of $40 billion.
- 28 million customers.

After researching a number of solutions and partners, the composite organization chose to work with IBM Information Management for its big data project.

As part of its big data initiative, our composite organization chose to focus its initial big data projects in one region of the US. For the purposes of this study, we will be focusing on this region. This region makes up about one-fifth of its US annual revenue and supports 4.2 million customers.

FRAMEWORK ASSUMPTIONS

Table 20 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 five 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 20
Model Assumptions

Ref.	Metric	Calculation	Value
O1	Hours per week		40
O2	Weeks per year		52
O3	Hours per year (M-F, 9-5)		2,080
O4	Hours per year (24x7)		8,736
O5	Average yearly value of a new customer		$1,000
O6	Average yearly value of an existing customer		$1,800
O7	Gross profit margin		13%

Source: Forrester Research, Inc.

Appendix C: Total Economic Impact™ Overview

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

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

BENEFITS

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

COSTS

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

FLEXIBILITY

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

RISKS

Risks measure the uncertainty of benefit and cost estimates contained within the investment. Uncertainty is measured in two ways: 1) the likelihood that the cost and benefit estimates will meet the original projections and 2) the likelihood that the estimates will be measured and tracked over time. TEI 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 D: 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.

TABLE [EXAMPLE]
Example Table

Ref.	Metric	Calculation	Year 1	Year 2	Year 3

Source: Forrester Research, Inc.

Appendix E: 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.

[2] Source: “Big Data In Banking: It’s Time To Act,” Forrester Research, Inc., April 15, 2014.

[3] Source: “Big Data In Banking: It’s Time To Act,” Forrester Research, Inc., April 15, 2014.

[4] Source: “Big Data In Banking: It’s Time To Act,” Forrester Research, Inc., April 15, 2014.