

# The Total Economic Impact™ Of IBM Watson Natural Language Processing (NLP) Solutions

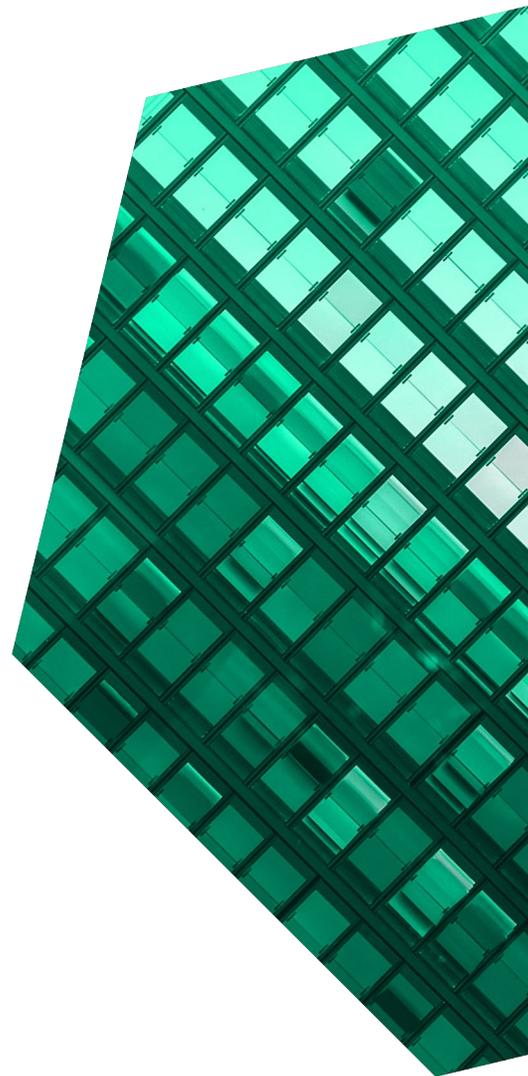
Cost Savings And Business Benefits  
Enabled By IBM Watson Natural Language Processing  
(NLP) Solutions

FEBRUARY 2021

# Table Of Contents

Consulting Team: Sarah Musto  
Connor Maguire

<b>Executive Summary</b> .....	<b>1</b>
Knowledge Worker Definition .....	5
Key Challenges .....	5
IBM Natural Language Processing Solutions .....	6
Composite Organization.....	7
<b>Analysis Of Benefits</b> .....	<b>8</b>
Knowledge Worker Productivity .....	8
Incremental Profit .....	10
Prior Tool Cost Avoidance.....	11
Unquantified Benefits .....	12
Flexibility.....	12
<b>Analysis Of Costs</b> .....	<b>14</b>
IBM License Costs .....	14
Use Case Development And Management.....	15
User Training.....	16
<b>Financial Summary</b> .....	<b>18</b>
<b>Appendix A: Total Economic Impact</b> .....	<b>19</b>
<b>Appendix B: Supplemental Material</b> .....	<b>20</b>
<b>Appendix C: Endnotes</b> .....	<b>20</b>



## ABOUT FORRESTER CONSULTING

Forrester Consulting provides independent and objective research-based consulting to help leaders succeed in their organizations. For more information, visit [forrester.com/consulting](https://forrester.com/consulting).

© 2021, Forrester Research, Inc. All rights reserved. Unauthorized reproduction is strictly prohibited. Information is based on the best available resources. Opinions reflect judgment at the time and are subject to change. Forrester®, Technographics®, Forrester Wave, RoleView, TechRadar, and Total Economic Impact are trademarks of Forrester Research, Inc. All other trademarks are the property of their respective companies.

## Executive Summary

Knowledge workers need fast access to information. Given the voluminous amount of data stored by enterprises, often in disparate systems, as well as the complex documents that knowledge workers must peruse, finding this information is often akin to searching for a needle in a haystack. Enterprises can leverage natural language processing (NLP) solutions that include cognitive search, text analytics, and machine learning capabilities to help knowledge workers make faster and smarter decisions.

Enterprises can benefit by collecting and storing vast amounts of unstructured data, but what is the true value of this data and its insights if both are difficult to find and understand? Natural language processing (NLP) solutions can help organizations turn unstructured data into insights and make information easy for customers and knowledge workers to access and understand, improving knowledge worker efficiency, boosting business growth, and increasing knowledge worker and customer satisfaction.

Intelligent search solutions — also referred to as AI-powered search, enterprise search, or cognitive search — like IBM Watson Discovery, deliver information, such as factoids, passages, and tables, from within enterprise content (such as contracts, RFPs, and technical manuals) in response to user queries. Unlike traditional search tools, organizations can train Watson Discovery to understand the domain-specific structure of documents, linguistic semantics, intent, and context so query responses include the most relevant and accurate answers.

Additionally, Watson Discovery includes the ability to mine content — also referred to as content mining, text analytics, or texting mining — that identifies trends, patterns, and anomalies in real time and/or from historical data. Organizations can use tools like Watson Discovery to augment knowledge workers' intelligence and their efficiency in searching through complex documents, providing self-service access to common questions, and surfacing expert advice to them while interacting with customers.

### KEY STATISTICS



Return on investment (ROI)

**383%**



Net present value (NPV)

**\$4.86M**

Text analysis solutions, like IBM Natural Language Understanding, extract metadata from text (such as keywords, concepts, and sentiment) and transform it into actionable insights. Organizations can use these tools to interpret customer feedback, optimize marketing efforts, quickly understand current events, and analyze the latest market data at scale.

IBM commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying the [IBM Watson Natural Language Processing \(NLP\)](#) portfolio of solutions, which includes [IBM Watson Discovery](#) and [IBM Watson Natural Language Understanding](#). The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of implementing these solutions.

To better understand the benefits, costs, and risks of this investment, Forrester interviewed four customers with experience using the IBM NLP solutions, which include both Watson Discovery and Watson Natural Language Understanding. For the purposes of this study, Forrester aggregated the experiences of the interviewed customers and combined the results into a single composite organization.

### KEY FINDINGS

**Quantified benefits.** Risk-adjusted present value (PV) quantified benefits include:

- **Knowledge workers that previously spent 20% of their time on text analysis/search tasks reduce that time by 50%.** The IBM NLP solutions help knowledge workers more quickly find important information within large documents and across many documents, increasing their efficiency in these tasks by 50% and enabling them to focus on delivering a higher quality and higher volume of work.

Reduction in time spent on information-gathering tasks

50%

- **Legacy tools can be replaced by the IBM NLP solutions, saving \$150,000 per year.** Traditional commercial or homegrown text analytics or search tools are replaced by the applications built using the IBM NLP solutions.
- **The efficiency and accuracy of IBM NLP tools deliver an additional 5% in business growth per year.** Whether its repurposing staff time for more valuable work or leveraging efficiencies to keep prices competitive, organizations see additional growth in parts of the business where their IBM NLP solutions are used.

Annual increase in revenue generated by workers using IBM NLP tools

5%

**Unquantified benefits.** Benefits that are not quantified for this study include:

- **The accuracy and speed of results delivered via the IBM NLP solutions increase work quality.** Organizations' NLP applications enable knowledge workers to review a higher volume of documents in a similar time frame, increasing the quality and thoroughness of their work.
- **Applications built with IBM NLP solutions improve knowledge worker and customer satisfaction.** By providing applications that can streamline information-gathering and search processes, the frustration that's associated with these formerly time-intensive tasks is reduced.

**Costs.** Risk-adjusted PV costs include:

- **IBM license costs.** The interviewed organizations incurred license costs for the IBM solutions used in their internal NLP applications.
- **Developer and subject matter expert (SME) time to build and train the organizations' NLP applications.** Developers spend time building the NLP application before its release, and they provide application maintenance on an ongoing basis. SMEs help to train the application both before its release and with ongoing feedback.
- **Training for the NLP application users.** Knowledge workers who use and benefit from the NLP applications spend 2 hours on training.

The analysis found that a composite organization experiences benefits of \$6.13M over three years versus costs of \$1.27M, adding up to a net present value (NPV) of \$4.86M and an ROI of 383%.



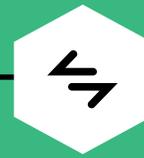
ROI  
**383%**



BENEFITS PV  
**\$6.13M**

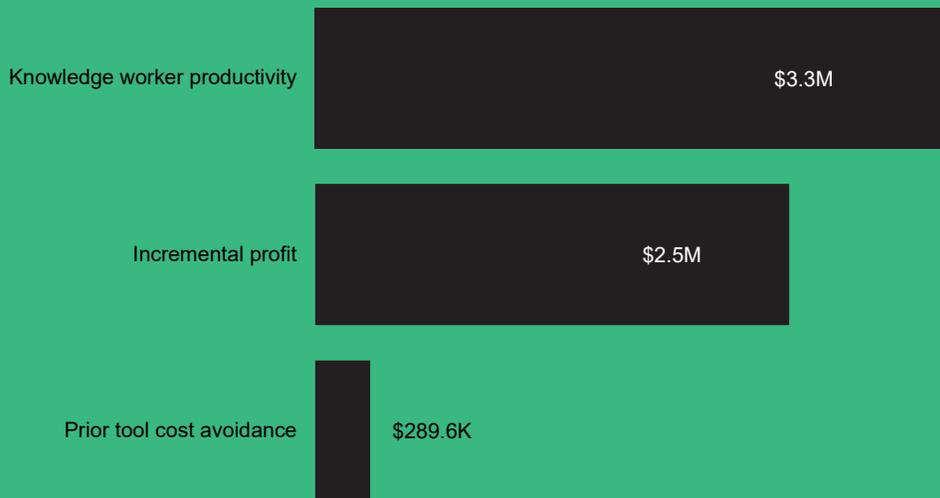


NPV  
**\$4.86M**



PAYBACK  
**13 months**

### Benefits (Three-Year)



## TEI FRAMEWORK AND METHODOLOGY

From the information provided in the interviews, Forrester constructed a Total Economic Impact™ framework for those organizations considering an investment in IBM Watson Natural Language Processing (NLP) solutions.

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

### DISCLOSURES

Readers should be aware of the following:

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

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



### DUE DILIGENCE

Interviewed IBM stakeholders and Forrester analysts to gather data relative to two IBM NLP solutions.



### CUSTOMER INTERVIEWS

Interviewed four decision-makers at organizations using the IBM NLP solutions to obtain data with respect to costs, benefits, and risks.



### COMPOSITE ORGANIZATION

Designed a composite organization based on characteristics of the interviewed organizations.



### FINANCIAL MODEL FRAMEWORK

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



### CASE STUDY

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

# IBM Watson Natural Language Processing (NLP) Solutions Customer Journey

■ Drivers leading to the IBM NLP solutions investment

Interviewed Organizations			
Industry	Region	Interviewee	IBM NLP Solutions
Industrial manufacturing	Headquartered in the European Union	Project manager	Watson Discovery
Legal services (shadow service provider)	Headquartered in the European Union	Cofounder and CEO	Watson Discovery
Online media (cloud service provider)	Headquartered in Asia Pacific	Cofounder and CEO	Watson Natural Language Understanding
Professional services (finance industry)	Headquartered in the United States	Managing director	Watson Discovery, Watson Natural Language Understanding

## KNOWLEDGE WORKER DEFINITION

Knowledge workers are the primary users and beneficiaries of NLP solutions. The main capital and value-add of knowledge workers is their knowledge. Their primary tasks revolve around resolving challenges that are *non-routine* and require analytical thinking, synthesizing information into insights, and informing business decisions.<sup>1</sup> These tasks include:

- Analyzing data to establish relationships.
- Assessing input in order to evaluate complex or conflicting priorities.
- Identifying and understanding trends.
- Making connections.
- Understanding cause and effect.

Knowledge workers depend on information to do their jobs well, and their expertise is the backbone of most enterprises. These workers span industries and specialties, and include positions such as:

- Physicians and pharmacists.
- Programmers.
- Lawyers.

- Maintenance professionals.
- Researchers and analysts.
- Design thinkers.
- Accountants.
- Media specialists.

As company data stores grow, knowledge workers have trouble finding and organizing the information they need; their workflows are frequently interrupted by searches for better information; and they can be forced to make suboptimal decisions on bad data.

There is a strong connection between knowledge worker productivity and technical innovation that improves access to data, such as AI. Knowledge workers should be equipped with tools and infrastructure that support their autonomy and tasks, so businesses can realize returns on their effectiveness and efficiency.<sup>2</sup>

## KEY CHALLENGES

Prior to investing in IBM NLP solutions, the interviewed organizations' legacy solutions included: homegrown or commercial keyword- or rule-based

search or text analysis tools, manual search, and centralized web pages.

The interviewed organizations struggled with common challenges, including:

- **The organizations’ business operations relied on understanding voluminous amounts of unstructured data.** Whether it’s HR staff responding to common questions (when knowledge workers can’t find their answers in documents) or a lawyer or accountant searching through massive amounts of complex documents (or deriving insights from online media sources), all of the interviewed organizations had critical functions that relied on understanding and searching through large volumes of text.
- **Deficiencies in traditional search and text analytics tools reduced the efficiency of knowledge workers.** Traditional tools didn’t understand the organizations’ specific document types and structures. These tools would only return lists of documents that contained the search for content, instead of the actual requested information. One interviewee claimed, “[Traditional tools] extracted keywords, but [they] didn’t have a good system of understanding how important each was relative to the other or of splitting them out into ways that we could easily understand.” Additionally, one interviewee even noted, “General-purpose AI is not going to cut it.”
- **Business operations couldn’t scale with the legacy tools and processes in place.** Interviewed organizations struggled with the business impact of maintaining these inefficient processes. Impacts included raising prices, sacrificing business growth, losing customers, and not having the time to help knowledge workers solve complex issues.

**“If we had not moved to an NLU [Natural Language Understanding] platform like Watson, we wouldn’t have been able to achieve any growth. It was an essential part of our business. Because the speed of development was so fast and we didn’t have to do a lot of core stuff ourselves, it allowed us so much more flexibility in that all of the other parts of our business were able to receive the care and the funding and the resources that they needed to continue because we weren’t having to invest in our own system.”**

*Chief of product, online media company*

## IBM NATURAL LANGUAGE PROCESSING SOLUTIONS

The interviewed organizations used a combination of the following IBM solutions:

- **IBM Watson Discovery.** Watson Discovery finds precise answers and extracts high-quality insights from enterprise documents and webpage data including, PDFs, HTML, tables, images, and more. It is an intelligent, AI-powered search and text analytics platform. Watson Discovery leverages NLP to understand the unique language of the business, regardless of domain or industry.
- **IBM Natural Language Understanding.** Watson Natural Language Understanding (NLU) uses deep learning to extract metadata such as keywords, concepts, sentiment, named entity recognition (NER), and categories from natural language text. Watson Natural Language Understanding can be used in Watson Discovery or as a standalone service.

## COMPOSITE ORGANIZATION

Based on the interviews, Forrester constructed a TEI framework, a composite company, and a ROI analysis that illustrates the areas financially affected. The composite organization is representative of the four companies that Forrester interviewed and is used to present the aggregate financial analysis in the next section. The composite organization has the following characteristics:

**Description of composite.** The composite organization is a large organization in a services industry that employs highly skilled knowledge workers to deliver revenue-generating services to clients. These knowledge workers review complex documents and collect information from a variety of sources to perform their jobs. They have access to rudimentary text analytics and search tools to assist in their data collection efforts, but, given the limitations of these tools, they still spend a significant amount of time on these tasks.

**Deployment characteristics.** The composite organization invests in the portfolio of IBM Watson Natural Language Processing (NLP) solutions (IBM Watson Discovery and IBM Watson Natural Language Understanding) to build a single application that can extract key information from documents and surface that information for user queries. Developer staff build the application, and SMEs work alongside developers to train the application to understand the structure of the documents that information is pulled from and to ensure that insights and results are accurate. Initially the application is rolled out to 200 users, this number grows up to 400 total users in Years 2 and 3.

### Key assumptions

- **Built one application to help 400 knowledge workers understand and search through content**
- **Rolled out in phases**

# Analysis Of Benefits

■ Quantified benefit data as applied to the composite

Total Benefits						
Ref.	Benefit	Year 1	Year 2	Year 3	Total	Present Value
Atr	Knowledge worker productivity	\$526,500	\$1,558,440	\$2,106,000	\$4,190,940	\$3,348,872
Btr	Incremental profit	\$212,500	\$850,000	\$2,125,000	\$3,187,500	\$2,492,205
Ctr	Prior tool cost avoidance	\$71,250	\$142,500	\$142,500	\$356,250	\$289,604
	Total benefits (risk-adjusted)	\$810,250	\$2,550,940	\$4,373,500	\$7,734,690	\$6,130,681

## KNOWLEDGE WORKER PRODUCTIVITY

**Evidence and data.** The key purpose of the composite’s NLP application is to deliver efficiencies to users that have to understand and search through large documents or across many documents to find the information they need to do their job. The interviewed organizations shared several different use cases where IBM NLP solutions delivered efficiency benefits to workers:

- “We created an HR chat solution where a user can interact with the system and can write a question [in natural language], and the user will get an answer based on this question. You will not get a FAQ sheet with 10 or 20 pages of content where for sure the answer is somewhere in there. Now, nearly 80% of all knowledge workers can use the solution, and we have half a million page visits per month.”
- “We can free up some HR capacity as they were spending day in and day out explaining where to find this and that form and this and that policy and explain very basic stuff. Now we have them provide and maintain this information within our [NLP application]. So, all the questions that are really generic are answered by [the HR chatbot], and HR staff can focus on the really tricky stuff.”
- “Journalists are time-poor. They don’t have the time to scrounge around and look for videos. It takes a little bit to get people used to the idea that I can be writing my article, click the button, and it’s going to tell me what videos I can use, and I can click it and it’s done in the second. People start using the tool very, very quickly, and then it becomes part of their regular day-to-day work.”
- “An auditor can say, ‘Look, AI has done the job,’ and they know they can rely on it to augment their work. They can now focus more on uncovering what is going on instead of searching through documents.”
- For financial services firms, organizations use IBM NLP solutions to interpret financial market data, customer feedback, optimize advertising and marketing efforts, quickly understand current events, and to analyze the latest market data at scale.

**“A question comes into the lawyer, and in the background Watson is already giving some proposals of possible snippets of good answers which could be useful for answering the question. We were able to reduce the time that lawyers spend on answering the questions.”**

*Cofounder and CEO, legal services*

**Modeling and assumptions.** For the composite organization, Forrester assumes that:

- The composite organization pursues a phased roll out of its NLP application. In Year 1 of the NLP application being live, 200 users within the organization have access. By Year 2, the NLP application is rolled out to all 400 users on the teams that can benefit from the solution.
- These 400 users are knowledge workers that must rely on information within long, complex documents to deliver revenue-generating projects to clients. Prior to the NLP application being available, these users spent on average 20% of their day searching for information to complete their tasks via manual efforts or simpler legacy tools.
- Once the NLP application is fully adopted, these users are 50% more efficient in their search tasks. Forrester assumes that in Year 1 of the NLP application being available to users, they experience a 25% efficiency boost as they learn how to use the application and become more comfortable with its accuracy.
- To be conservative, Forrester assumes that 50% of saved time is repurposed to deliver additional work.

- The average fully loaded annual compensation (salary plus the value of benefits) across these users is \$117,000.

**Risks.** Risks that can impact the realization of this benefit include:

- The productivity generated will depend on the accuracy of results. Organizations must ensure enough examples are provided when both initially training the model and with any ongoing, feedback-based relevancy training.
- Productivity benefits will depend on the level of tool adoption and the amount of knowledge worker time that is spent on tasks that could benefit from the application.

To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of \$3.3 million.

Knowledge Worker Productivity					
Ref.	Metric	Calculation	Year 1	Year 2	Year 3
A1	Number of knowledge workers with access to the NLP application	Interviews	200	400	400
A2	Percent of day spent on searching tasks	Interviews	20%	20%	20%
A3	Productivity improvement for searching tasks due to the NLP application	Interviews	25%	37%	50%
A4	Productivity capture	Assumption	50%	50%	50%
A5	Average fully loaded compensation, knowledge worker	Assumption	\$117,000	\$117,000	\$117,000
At	Knowledge worker productivity	$A1 \times A2 \times A3 \times A4 \times A5$	\$585,000	\$1,731,600	\$2,340,000
	Risk adjustment	↓10%			
Atr	Knowledge worker productivity (risk-adjusted)		\$526,500	\$1,558,440	\$2,106,000
<b>Three-year total: \$4,190,940</b>			<b>Three-year present value: \$3,348,872</b>		

**INCREMENTAL PROFIT**

**Evidence and data.** More efficient knowledge workers repurpose time to deliver additional revenue. Interviewees shared the following examples of how their IBM NLP solutions enhanced business growth:

- “If we could not work with the AI technology that we have, we would need to raise our prices. We would lose customers.”
- “We went from a few tens of thousands with our very first customer to tens of millions of streams per month. We could not have achieved what we did achieve if we weren’t using NLU.”

**“We have done hundreds of these engagements where this [NLP] tool has been used. We have been able to scale to those hundreds of numbers of engagement in part because of the [NLP] tool.”**

*Managing director, professional services*

**Modeling and assumptions.** For the composite organization, Forrester assumes that:

- Given the productivity improvements generated by the NLP application (see the benefit calculation above), the same team of knowledge workers can deliver up to 5% additional revenue via delivering on additional projects with saved time. This benefit ramps up in Years 1 and 2 as the NLP application is adopted.
- For this team of knowledge workers, the average revenue delivery per worker, prior to the NLP application, is \$500,000.
- The average profit margin for the composite organization is 25%. This is consistent with a professional or business services organization.

**Risks.** Risks that can impact the realization of this benefit include:

- Incremental profit will depend on the availability of additional work for more efficient knowledge workers, the revenue associated with that work,

and the margin on that work, which will vary from organization to organization.

To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV of \$2.5 million.

Incremental Profit					
Ref.	Metric	Calculation	Year 1	Year 2	Year 3
B1	Annual revenue for teams with access to the NLP application	Assumption	\$100,000,000	\$200,000,000	\$200,000,000
B2	Increase in revenue due to the NLP application	Interviews	1.0%	2.0%	5.0%
B3	Average net profit margin	Assumption	25%	25%	25%
Bt	Incremental profit	B1*B2*B3	\$250,000	\$1,000,000	\$2,500,000
	Risk adjustment	↓15%			
Btr	Incremental profit (risk-adjusted)		\$212,500	\$850,000	\$2,125,000
<b>Three-year total: \$3,187,500</b>			<b>Three-year present value: \$2,492,205</b>		

**PRIOR TOOL COST AVOIDANCE**

**Evidence and data.** The IBM NLP solutions used by the interviewed organizations replace existing tools, enabling organizations to avoid the costs of those legacy solutions and associated development efforts.

**Modeling and assumptions.** For the composite organization, Forrester assumes that:

- The composite organization had rudimentary search and text analysis tools prior to its NLP solution investment. The combination of technology costs (license and hardware), development, and maintenance for these legacy tools was \$150,000 per year. By the beginning of Year 2, all knowledge workers are transitioned to the NLP application and the legacy solution is retired, resulting in cost savings.

**Risks.** Risks that can impact the realization of this benefit include:

- Legacy solutions differed in the capability they offered to users, the amount of development effort needed to grow and maintain them, and the cost for the hardware and software associated with the solutions.

To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year, risk-adjusted total PV of \$290,000.

Prior Tool Cost Avoidance					
Ref.	Metric	Calculation	Year 1	Year 2	Year 3
C1	Prior tool cost	Interviews	\$150,000	\$150,000	\$150,000
C2	Percent of prior cost avoided each year	Interviews	50%	100%	100%
Ct	Prior tool cost avoidance	C1*C2	\$75,000	\$150,000	\$150,000
	Risk adjustment	↓5%			
Ctr	Prior tool cost avoidance (risk-adjusted)		\$71,250	\$142,500	\$142,500
Three-year total: \$356,250			Three-year present value: \$289,604		

**UNQUANTIFIED BENEFITS**

Additional benefits that customers experienced but were not able to quantify include:

- **Organizations’ NLP applications can increase the quality of work.** While partially captured through the incremental profit benefit, the faster speed of information access can also increase the amount of information that is included as part of a deliverable, which potentially increases its quality and thoroughness. One interviewee said: “This was more about accuracy and quality of work. The business of audits — it’s a sampling business. You pick a sample, and then you uncover anomalies. With these new tools, our goal was, ‘Can I increase the sample size?’”
- **Knowledge worker and customer satisfaction increase with more streamlined information access.** Knowledge workers appreciate when these more menial tasks are made simpler.
  - One interviewee shared that before using their NLP application: “You use one of our search engines. You get a result in a minute if you’re lucky, or you spend 10 minutes, get frustrated, and then call the hotline because you cannot find the answer yourself.” Now knowledge workers can avoid that frustration and get

simple HR questions answered by an easy-to-use HR chatbot.

- Another interviewee shared how their NLP tool helped customers avoid frustration, noting: “Journalists don’t want to click a button and sit there and wait 10 minutes for the system to come back with the result. So, one of the most important things was that Watson was able to return a result very quickly and accurately.”

**FLEXIBILITY**

The value of flexibility is unique to each customer. There are multiple scenarios in which a customer might implement IBM NLP solutions and later realize additional uses and business opportunities, including:

- **Expanding NLP to additional use cases in the interviewed organizations.** Through the variety of use cases heard across the interviews and the flexibility of these IBM solutions in delivering those use cases, the door to benefitting other users or streamlining additional tasks with the help of NLP is opened. The composite organization is also able to explore adding IBM Watson Assistant to its portfolio of IBM NLP solutions for the purpose of simply and accurately

addressing customer or knowledge worker requests via chatbots.

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

# Analysis Of Costs

■ Quantified cost data as applied to the composite

Total Costs							
Ref.	Cost	Initial	Year 1	Year 2	Year 3	Total	Present Value
Dtr	IBM license costs	\$84,000	\$126,000	\$126,000	\$126,000	\$462,000	\$397,343
Etr	Use case development and management	\$480,755	\$139,508	\$139,508	\$139,508	\$899,278	\$827,690
Ftr	User training	\$23,520	\$23,520	\$0	\$0	\$47,040	\$44,902
	Total costs (risk-adjusted)	\$588,275	\$289,028	\$265,508	\$265,508	\$1,408,318	\$1,269,935

## IBM LICENSE COSTS

**Modeling and assumptions.** For the composite organization, Forrester assumes that:

- The composite organization invests in Watson Discovery and Watson Natural Language Understanding to build its NLP application.
- Monthly costs for this set of tools averages \$10,000. These costs are representative of typical IBM discounts.
- The Initial period represents eight months where the NLP solutions are being used to build, test, and train applications before they are rolled out to users at the beginning of Year 1.

**Risks.** Risks that can impact the magnitude of this cost include:

- Software costs can vary from organization to organization based on different pricing tiers, vendor discounts, or volume discounts.

To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of almost \$400,000.

IBM License Costs						
Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
Dt	IBM license costs	Assumption	\$80,000	\$120,000	\$120,000	\$120,000
	Risk adjustment	↑5%				
Dtr	IBM license costs (risk-adjusted)		\$84,000	\$126,000	\$126,000	\$126,000
<b>Three-year total: \$462,000</b>			<b>Three-year present value: \$397,343</b>			

## USE CASE DEVELOPMENT AND MANAGEMENT

**Evidence and data.** Depending on the complexity of the use case, the interviewed organizations trialed their selected NLP solutions over the course of a few weeks, and then developers and SMEs spent several months to a year building and training the first release of the NLP application. Once the NLP application is released, developers and SMEs spend minimal ongoing time rolling out the application to new users, collecting feedback, training the application to be more accurate, and performing maintenance activities. Interviewees shared the following:

- “When this whole journey started, we did a three-day design thinking workshop together with our IBM colleagues. We had a very open brainstorming and put all of our crazy ideas on paper and together discussed and talked about those. We went ahead, we set up a mini project, and in three weeks we designed the first prototype.”
- “We did everything on our own, and it was quite easy. We built a couple of APIs to connect with our system and then did manual training in the Watson Discovery backend with our data.”
- “When we first went to use Watson NLU, it was an extremely straightforward and simple process to implement the API. We were up and running within a day. Then the major development for us was going through and understanding the results. Within weeks we had a workable model, and within months we had a model that we were happy with, but it’s always a process of tweaking and fine-tuning.”
- “We had very domain-intensive, knowledge-intensive training, meaning we brought in actual [SMEs].”

**Modeling and assumptions.** For the composite organization, Forrester assumes that:

- The composite organization spent eight months trialing, building, and training its NLP application before it was ready to be rolled out to users.
- Over the course of that eight-month period, five developer staff worked full-time building and training the NLP application. SMEs spent a total of 87 hours each month training the NLP application.
- Once the NLP application is released, developers each spend 35 hours per month on patches, upgrades, and enhancements. SMEs spend a total of 9 hours per month training the model to increase its accuracy.
- The average annual fully loaded compensation (salary plus the value of benefits) for developer staff is \$119,600. For SMEs, it is \$117,000.

**Risks.** Risks that can impact the magnitude of this cost include:

- Some interviewees noted limitations in character length for ingested documents, which would require additional time to prepare and segment documents.
- The amount of time spent building and training the NLP application varied significantly based on the complexity of the use case.
- Some interviewees found incorporating feedback while training the application to be a more manual process than expected.

To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year, risk-adjusted total PV of \$828,000.

Use Case Development And Management						
Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
E1	Number of months	Interviews	8	12	12	12
E2	Development team staff	Interviews	5	5	5	5
E3	Development team hours per staff (per month)	Interviews	173	35	35	35
E4	Average fully loaded compensation, development team	Assumption	\$119,600	\$119,600	\$119,600	\$119,600
E5	SME hours (per month)	Interviews	87	9	9	9
E6	Average fully loaded compensation, SMEs	Assumption	\$117,000	\$117,000	\$117,000	\$117,000
Et	Use case development and management	$E1*((E2*E3*(E4/2,080))+(E5*(E6/2,080)))$	\$437,050	\$126,825	\$126,825	\$126,825
	Risk adjustment	↑10%				
Etr	Use case development and management (risk-adjusted)		\$480,755	\$139,508	\$139,508	\$139,508
<b>Three-year total: \$899,278</b>			<b>Three-year present value: \$827,690</b>			

## USER TRAINING

**Modeling and assumptions.** For the composite organization, Forrester assumes that:

- The NLP application users receive 2 hours of training upfront. The adoption curve built into the benefit calculations captures the time it takes for users to maximize their benefit from the tool and for the accuracy of the tool to increase.
- Training is minimal because users can interact with the NLP application in natural language without having to learn a specialized query language.
- The average hourly fully loaded compensation (salary plus the value of benefits) for SMEs is \$56 (or \$117,000 per year).

**Risks.** Risks that can impact the magnitude of this cost include:

- While training is minimal, due to the NLP application being built into tools that users are

familiar with, users still need to be made aware of the NLP application and how it will change their work processes.

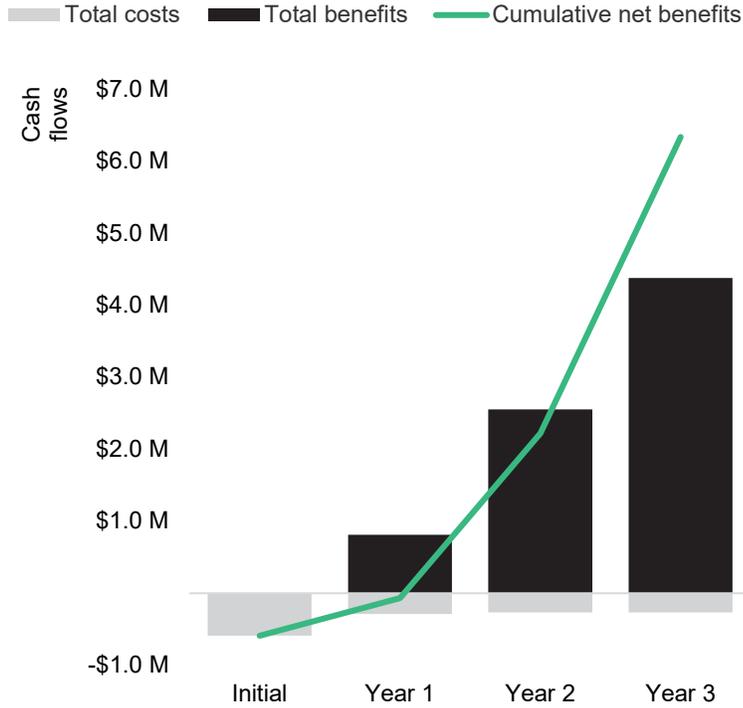
To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year, risk-adjusted total PV of \$45,000.

<b>User Training</b>						
<b>Ref.</b>	<b>Metric</b>	<b>Calculation</b>	<b>Initial</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
F1	Number of knowledge workers requiring training on the NLP application	Interviews	200	200	0	
F2	Hours of training, per knowledge worker	Interviews	2	2	2	
F3	Average fully loaded compensation per hour, knowledge worker	Assumption	\$56	\$56	\$56	\$56
Ft	User training	$F1 \cdot F2 \cdot F3$	\$22,400	\$22,400	\$0	\$0
	Risk adjustment	↑5%				
Ftr	User training (risk-adjusted)		\$23,520	\$23,520	\$0	\$0
<b>Three-year total: \$47,040</b>			<b>Three-year present value: \$44,902</b>			

# Financial Summary

## CONSOLIDATED THREE-YEAR RISK-ADJUSTED METRICS

### Cash Flow Chart (Risk-Adjusted)



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

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

### Cash Flow Analysis (Risk-Adjusted Estimates)

	Initial	Year 1	Year 2	Year 3	Total	Present Value
Total costs	(\$589,058)	(\$287,620)	(\$263,995)	(\$263,995)	(\$1,404,668)	(\$1,269,935)
Total benefits	\$0	\$810,250	\$2,550,940	\$4,373,500	\$7,734,690	\$6,130,681
Net benefits	(\$589,058)	\$522,630	\$2,286,945	\$4,109,505	\$6,330,022	\$4,860,746
ROI						383%
Payback period						13 months

# Appendix A: Total Economic Impact

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

## TOTAL ECONOMIC IMPACT APPROACH

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

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

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

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

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



## PRESENT VALUE (PV)

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



## NET PRESENT VALUE (NPV)

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



## RETURN ON INVESTMENT (ROI)

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



## DISCOUNT RATE

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



## PAYBACK PERIOD

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

## Appendix B: Supplemental Material

### *Related Forrester Research*

“Research Overview: Text Analytics Technology,” Forrester Research, Inc., July 18, 2019

“The Forrester Wave™: AI-Based Text Analytics Platforms (Document Focused), Q2 2020,” Forrester Research, Inc., June 17, 2020

“The Forrester Wave™: Cognitive Search, Q2 2019,” Forrester Research, Inc., May 29, 2019

## Appendix C: Endnotes

---

<sup>1</sup> Source: Nathaniel Palmer, Keith D Swenson, Steinar Carlsen, *Empowering Knowledge Workers: New Ways to Leverage Case Management*, Future Strategies Inc., 2013.

<sup>2</sup> Source: Don Tapscott, Anthony D. Williams, *Wikinomics: How Mass Collaboration Changes Everything*, Penguin Group, 2006.

FORRESTER®