New Technology: The Projected Total Economic Impact™ Of IBM Cloud Pak For Data

Cost Savings And Business Benefits Enabled By
Cloud Pak for Data, An Integrated Data
And AI Platform

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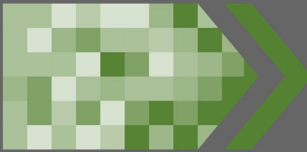**FORRESTER®**

Key Benefits

Reduced infrastructure management effort:
65% to 85%

Reduced ETL requests:
25% to 65%

Data science, ML, and AI benefits:
$1.2 million to $3.4 million

Executive Summary

Forrester predicts that, for artificial intelligence (AI), 2020 will be a year of less experimentation and more implementation, and as a result the companies that focus on the right strategy, skills, governance, data, and tools will get ahead of those that don't think holistically about applying AI across the enterprise.[1] It will be a year of more implementation, but many such implementations will fail to meet business expectations – the reason: data issues.

IBM Cloud Pak for Data provides an insight platform that combines data management with data science / AI development to help firms realize value. IBM commissioned Forrester Consulting to conduct a New Technology: Projected Total Economic Impact™ (New Tech TEI) study and examine the projected return on investment (PROI) enterprises may realize by deploying Cloud Pak for Data.

The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of Cloud Pak for Data on their organizations. To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed four customers with experience using Cloud Pak for Data.

Prior to using Cloud Pak for Data, the interviewed organizations were using various data management, analytics, data science, AI, and machine learning (ML) tools. However, organizations we studied reported challenges such as: the need to prepare for cloud migration; a desire to increase innovation by leveraging AI stymied by an increasing amount of data with no cohesive governance strategy; and difficulty in managing multiple point solutions.

The interviewed organizations decided to deploy IBM Cloud Pak for Data because it helped address these challenges within a single integrated insight platform.[2] This move provided significant potential in three areas: containers and container management efficiencies in software management; data governance and delivery benefits through data virtualization; and business value delivery benefits through improved data science, ML, and AI.

To estimate the projected total economic impact of Cloud Pak for Data, Forrester developed a composite organization from four companies that are implementing Cloud Pak for Data. Our composite company is a global organization with $2 billion in annual revenue, 8,000 employees, and has deployed on-premises solutions in all four functional areas of Cloud Pak for Data (*Collect*, *Organize*, *Analyze*, *Infuse*).

Furthermore, we assumed for the sake of analysis that our composite organization has deployed solutions in all four functional areas of Cloud Pak for Data even though most customers will start with one or two sets of solutions and phase in deployment over time, stretching the actual benefits and costs over a longer period of time.

All values are reported in risk-adjusted three-year present value (PV) unless otherwise indicated.

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[1] Source: "Predictions 2020: Artificial Intelligence," Forrester Research, Inc., Oct. 30, 2019.
[2] Source: "The Anatomy Of A System Of Insight," Forrester Research, Inc., Jan. 5, 2018.

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**PROI
274% to
459%**

**Benefits PV
$7.9 million to
$11.8 million**

**NPV
$5.8 million to
$9.7 million**

Key Financial Findings

Quantified projected benefits. The following benefits reflect the financial analysis associated with the composite organization.
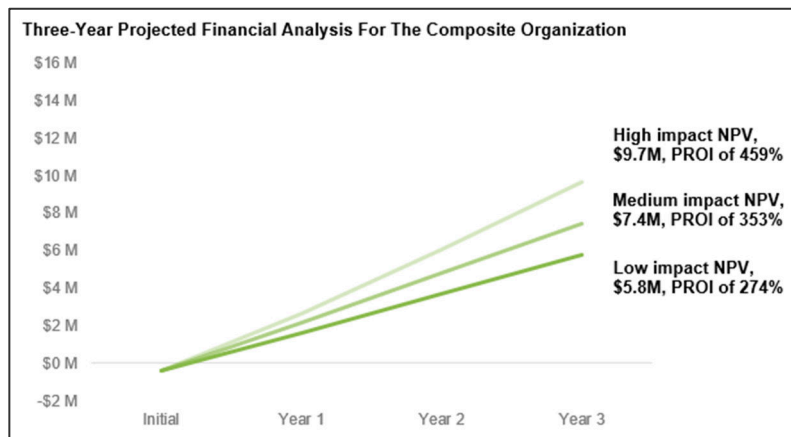
› **Containers and container management efficiencies totaling $6.2 million to $7.2 million.** With Cloud Pak for Data, companies can improve their readiness for cloud migration, improve licensing flexibility with IBM, and reduce both hardware purchases and infrastructure management efforts.

› **Data virtualization benefits totaling $466,280 to $1.2 million.** Data virtualization "democratizes" data accessibility across the organization, improves data governance and security, and can allow companies to avoid costly data migration projects.

› **Data science, ML, and AI benefits totaling $1.2 million to $3.4 million.** Cloud Pak for Data helps data scientists improve productivity through faster model development and deployment. Additionally, due to Cloud Pak for Data's integrated platform, companies avoided costs associated with legacy analytics tools or otherwise building comparable integrated data management and science solutions internally.

Costs. The following costs reflect the financial analysis associated with the composite organization.

› **License and professional services costs totaling $473,619.** These include on-premises license costs for Cloud Pak for Data, annual maintenance fees, and professional services for implementation.

› **Internal implementation and operation costs totaling $2.1 million.** These include internal fulltime equivalents (FTEs) for implementation, maintenance of data stores, data governance activity, data operations, training of data scientists, and hardware costs.

Forrester modeled a range of projected low, medium, and high impact outcomes based on evaluated risk factors. This financial analysis projects that the composite organization accrues the following three-year net present value (NPV) and PROI for each scenario by investing in Cloud Pak for Data:

› Projected high impact of a $9.7 million NPV and a 459% PROI.

› Projected medium impact of a $7.4 million NPV and a 353% PROI.

› Projected low impact of a $5.8 million NPV and an 274% PROI.

Three-Year Projected Financial Analysis For The Composite Organization

High impact NPV, $9.7M, PROI of 459%

Medium impact NPV, $7.4M, PROI of 353%

Low impact NPV, $5.8M, PROI of 274%

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New Tech TEI Framework And Methodology

From the information provided in the interviews, Forrester has constructed a New Technology: Projected Total Economic Impact™ (New Tech TEI) framework for those organizations considering implementing IBM Cloud Pak for Data.

The objective of the framework is to identify the potential cost, benefit, flexibility, and risk factors that affect the investment decision. Forrester took a multistep approach to evaluate the projected impact that IBM Cloud Pak for Data may have on an organization:

DUE DILIGENCE
Interviewed IBM stakeholders and Forrester analysts to gather data relative to Cloud Pak for Data.

EARLY-IMPLEMENTATION CUSTOMER INTERVIEWS
Interviewed four organizations using Cloud Pak for Data in a pilot or beta stage to obtain data with respect to projected costs, benefits, and risks.

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

PROJECTED FINANCIAL MODEL FRAMEWORK
Constructed a financial model projection representative of the interviews using the New Tech TEI methodology and risk-adjusted the financial model based on issues and concerns of the interviewed organizations.

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

DISCLOSURES

Readers should be aware of the following:

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

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

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

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

The New Tech TEI methodology helps companies demonstrate and justify the projected tangible value of technology initiatives to both senior management and other key business stakeholders.

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The Cloud Pak For Data Customer Journey

BEFORE AND AFTER THE CLOUD PAK FOR DATA INVESTMENT

Interviewed Organizations

For this study, Forrester conducted four interviews with IBM Cloud Pak for Data customers. Interviewed customers include the following:

INDUSTRY	REGION	INTERVIEWEE	NUMBER OF EMPLOYEES	ANNUAL REVENUE
Mobile and telecom services	APAC, EMEA	General manager, telecommunications and emerging technologies	80	$15 million
Financial services	North America	Director of data management	5,000	$2 billion
Financial services	Global	Information architect	50,000	$10 billion+
Consulting services	Global	Managing director of artificial intelligence innovation	100,000+	$10 billion+

Key Challenges Before IBM Cloud Pak For Data

Before the investment in Cloud Pak for Data, interviewees described the following challenges for their organization, and why they felt Cloud Pak for Data was the right solution for them:

› **Inability to migrate fully to the cloud, but desire to prepare the company for that transition in the future.** Most companies recognize the value of cloud storage and operations, however many companies are restricted by regulation or legacy workloads in their ability to migrate. With Cloud Pak for Data, companies get many of the benefits of public cloud platforms in an on-premises system that sits within their firewall. Cloud Pak for Data can also be deployed in a multicloud environment (public clouds, private cloud, and on-premises), which provides further flexibility for companies.

A managing director said: "We didn't want the classic software installation process; we wanted all the benefits you get on public cloud. So it was a no brainer when IBM came to us with Cloud Pak for Data, saying that it will leverage containers, Kubernetes, and provisioning software, while also providing us with security, self-service, control, user groups, access controls, and the control we need and would get from an on-premises environment."

› **An increasing amount of data with no cohesive governance strategy.** Companies are struggling with managing the quickly increasing amounts of data in their organizations and setting up a cohesive governance system and strategy. Cloud Pak for Data's *Collect* and *Organize* solutions help address that challenge.

A managing director told Forrester: "The data governance component was a big win for us, a primary driver. Data cataloging, indexing, documenting policy and ability to implement that policy, data quality and the metrics associated with it. It's all there."

"Before Cloud Pak for Data, we had some proprietary data warehouses, but there was no overall governance tool or data catalog. There was no centrally located enterprise cataloging, other than some attempts at filling out a spreadsheet."

Director of data management, financial services industry

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› **Difficulty in managing multiple point solutions.** IBM has a single integrated platform in Cloud Pak for Data, which makes data management, analytics, and insight applications easier to manage compared to several point solutions that would be needed to accomplish the same tasks.

A general manager told Forrester: "Some vendors have cloud capability but not much in AI. Others have very specific AI use cases. Some have AI but no integrations with the cloud. This is why we chose IBM, because Cloud Pak for Data is an integrated platform and that's what we were looking for."

› **Desire to increase innovation by leveraging AI.** Clients widely regard AI as a future differentiator; Cloud Pak for Data helps companies leverage AI in their innovation activities with its *Analyze* and *Infuse* solutions.

Key Projected Results With IBM Cloud Pak For Data

Our interviews indicated that clients invested in Cloud Pak for Data to address the challenges previously identified, and were seeing early benefits indications in three areas:

› **Containers and container management efficiencies.** With Cloud Pak for Data, companies can improve their readiness for cloud migration, improve licensing flexibility with IBM, and reduce both hardware purchases and infrastructure management efforts.

A managing director said: "We looked at all the competitors to Cloud Pak for Data, and while we could run them with containers and microservices, none of them allowed us to run the platform inside our firewall. For regulatory reasons, we need to keep our data on-prem, but we want to run it like the public cloud and potentially be ready to move to the cloud in the future."

› **Data virtualization and governance benefits.** Data virtualization "democratizes" data visibility across the organization, improves data governance and security, and can allow companies to avoid costly data migration projects.

A managing director told Forrester: "We're now going to be able to perform better analysis and analytics. We can make datasets available to business analysts and data scientists without needing to migrate the data, which is costly from a pure effort perspective but also delays access to that data."

› **Data science, ML, and AI benefits.** Data scientists are both more productive with Cloud Pak for Data and can deploy models to market faster. Additionally, due to Cloud Pak for Data's integrated platform, companies avoided costs associated with legacy analytics tools or otherwise building a comparable solution internally.

A general manager stated: "Time-to-market and time to innovate has to be faster, and we need to do more without doubling the data scientists we have on staff. This is why we're using Cloud Pak for Data."

"We wanted AI and ML data capabilities that sit on-prem but still have the modern cloud benefits. And by having a standardized piece of infrastructure, with OpenShift being the orchestration platform, Cloud Pak for Data checked all the boxes."

Managing director of artificial intelligence innovation, consulting services industry

"Data virtualization is a major benefit. By giving self-service capabilities to users, they will have more understanding of what enterprise data there is, and also understand if their data request is worth sending through the ETL chain. And when the development team does get a request at that point, they'll know it will be an important request."

Information architect, financial services industry

"The improvement in overall governance and control with Cloud Pak for Data, especially from a regulatory perspective, is significant – it has exceeded our expectations."

Director of data management, financial services industry

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› **Platform benefits.** There are potentially significant benefits related to different users within the organization being able to work in the same platform from a single vendor, from task automation capabilities (e.g., Augmented AI, Auto AI, and Auto Discovery) to improved documentation capabilities allowing easier transition of work between project teams or new project members. This allows for better collaboration across the company, in addition to simpler vendor management.

Composite Organization

Forrester constructed a composite company to evaluate the projected Total Economic Impact of Cloud Pak for Data. The composite organization was constructed using characteristics of four interviewed Cloud Pak for Data customer companies. Our composite organization:

› Is a global enterprise with $2 billion in annual revenue and 8,000 employees.

› Has 5 separate large-scale data management infrastructure (e.g., data stores) located in different countries.

› Before investing in Cloud Pak for Data, had already employed five data scientists and was using various data analytical tools.

› While not required, made an organization-wide decision to pursue container management; Cloud Pak for Data uses OpenShift as its orchestration platform (note, OpenShift is included in the Cloud Pak for Data license).

› Deployed on-premises solutions in all four functional areas of Cloud Pak for Data (*Collect*, *Organize*, *Analyze*, *Infuse*).

Note that in order to model a complete benefits picture, our composite organization has deployed data management, data science, and AI solutions in all four areas of Cloud Pak for Data (*Collect*, *Organize*, *Analyze*, *Infuse*). Many customers will start with one or two sets of solutions and phase in deployment over time, which will spread benefits and costs over a longer period of time.

Key assumptions
- Global organization
- $2 billion annual revenue
- 8,000 employees

Risk Treatment For Benefits And Costs Projections

Projection-based financial modeling introduces inherently more risk than analyzing actual, realized impacts. Forrester's New Technology: Projected TEI methodology therefore incorporates a risk factor to adjust projections.

For benefit calculations, Forrester incorporates risk via a range of projected outcomes based on customer interview data. In the benefit financial models, low, middle, and high estimates are included for each input variable to create a potential benefit range. We develop these ranges using expected benefits data collected from interviews as well as our own research into insight platforms, data management, and AI.

Costs are more consistent and easily estimated, combining interview data with IBM-provided license and support costs. We therefore use a simplified approach, adjusting cost upward based on risk to ensure a conservative financial analysis. This is described further in the "Analysis Of Projected Costs" section.

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

Implementation risk is the risk that a proposed investment may deviate from the original or expected requirements, resulting in higher costs than anticipated. The greater the uncertainty, the higher the potential costs.

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Analysis Of Projected Benefits

QUANTIFIED PROJECTED BENEFIT DATA AS APPLIED TO THE COMPOSITE
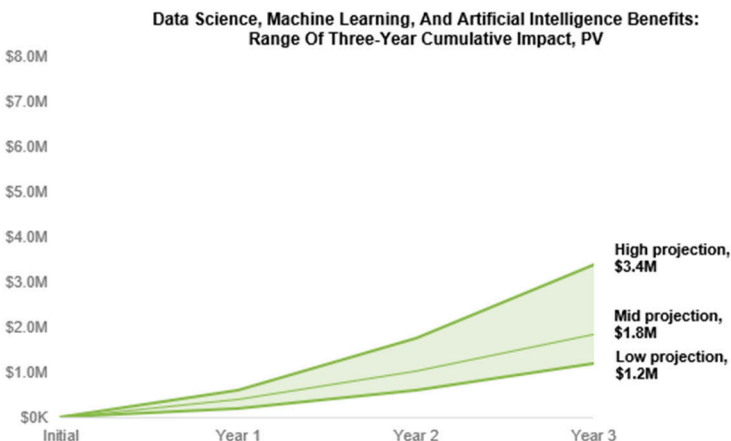
Total Projected Benefits

REF.	BENEFIT	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
	Total projected benefits (Low)	$2,915,500	$3,188,500	$3,456,500	$9,560,500	**$7,882,498**
	Total projected benefits (Mid)	$3,536,500	$3,858,500	$4,175,500	$11,570,500	**$9,540,958**
	Total projected benefits (High)	$4,055,500	$4,786,500	$5,512,500	$14,354,500	**$11,784,226**

The table above shows the total of all benefits across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the composite organization expects risk-adjusted total benefits to have a projected PV range of $7.9 million to $11.8 million.
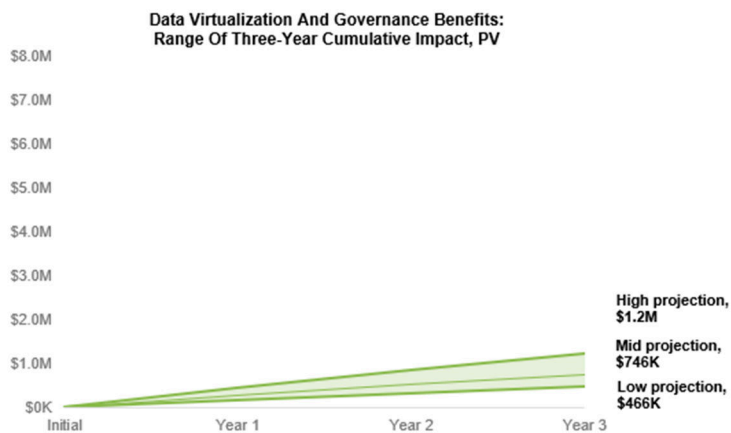
The graphs to the left show the projection range for each benefit category quantified. Adding these benefits together will result in the total benefits values listed in the table above.

Containers And Container Management Efficiencies: Range Of Three-Year Cumulative Impact, PV

High projection, $7.2M
Mid projection, $7.0M
Low projection, $6.2M

Data Virtualization And Governance Benefits: Range Of Three-Year Cumulative Impact, PV

High projection, $1.2M
Mid projection, $746K
Low projection, $466K

Data Science, Machine Learning, And Artificial Intelligence Benefits: Range Of Three-Year Cumulative Impact, PV

High projection, $3.4M
Mid projection, $1.8M
Low projection, $1.2M

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Benefit 1: Containers And Container Management Efficiencies

Interviewed organizations described the following benefits related to containers and container management efficiencies:

› Companies that are not yet ready to migrate to cloud can now prepare themselves for a future move to cloud. By having OpenShift as the underlying container orchestration platform for Cloud Pak for Data, companies can manage their on-premises environment in a cloud-like manner and begin developing workloads using container technology. This also reduces overall infrastructure management efforts due to container automation assisting with complex middleware management operations using Kubernetes.

› Additionally, companies are able to improve hardware utilization with workloads running on containers.

› Leveraging containers for workloads allows companies to have licensing flexibility with IBM. Customers have the flexibility to use their entitlement across any of the services within Cloud Pak for Data.

Of these, improved cloud migration readiness and licensing flexibility are difficult to represent in a financial model because their major benefits are more strategic in nature, as opposed to impacting near-term quantitative metrics. However, the projected impact of improved hardware utilization and reduced management effort can be included in the financial model.

Based on the customer interviews, Forrester modeled the financial impact for the composite organization with the following estimates:

› The composite organization has 5 data stores located in different countries.

› For each data store, there are three IT FTEs responsible for managing the infrastructure. With Cloud Pak for Data, the composite expects to reduce that effort by between 65% to 85%, which allows the IT FTEs to spend more time on higher value tasks (e.g., innovation).

› A third of the composite organization's servers are refreshed annually. Due to an increase in hardware utilization, the composite expects to reduce the amount of hardware purchases by 33% during each refresh cycle.

This yields a three-year projected PV ranging from $6.2 million to $7.2 million. The summary table for the low, mid, and high projections is shown below, followed by the detailed calculations for each projection.

Reduced infrastructure management effort:
65% to 85%

	Benefit 1: Containers And Container Management Efficiencies: Summary Table					
REF.	BENEFIT	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
At$_{LOW}$	Containers and container management efficiencies (Low)	$2,505,000	$2,505,000	$2,505,000	$7,515,000	**$6,229,564**
At$_{MID}$	Containers and container management efficiencies (Mid)	$2,797,500	$2,797,500	$2,797,500	$8,392,500	**$6,956,968**
At$_{HIGH}$	Containers and container management efficiencies (High)	$2,895,000	$2,895,000	$2,895,000	$8,685,000	**$7,199,437**

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Benefit 1: Containers and Container Management Efficiencies: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
A1	Number of data stores	Composite organization	5	5	5		
A2	IT FTEs per data store	Composite organization	3	3	3		
A3$_{LOW}$ A3$_{MID}$ A3$_{HIGH}$	Percent reallocated effort with IBM Cloud Pak for Data	Composite organization	65% 80% 85%	65% 80% 85%	65% 80% 85%		
A4	IT FTE fully burdened annual salary	Composite organization	$130,000	$130,000	$130,000		
A5$_{LOW}$ A5$_{MID}$ A5$_{HIGH}$	Subtotal: Reallocated IT effort	A1*A2*A3*A4	$1,267,500 $1,560,000 $1,657,500	$1,267,500 $1,560,000 $1,657,500	$1,267,500 $1,560,000 $1,657,500		
A6	Number of servers	Composite organization	750	750	750		
A7	Number of servers refreshed annually	A6/3	250	250	250		
A8	Reduction of hardware, with IBM Cloud Pak for Data	Composite organization	33%	33%	33%		
A9	Cost per server	Composite organization	$15,000	$15,000	$15,000		
A10	Subtotal: Avoided hardware costs	A7*A8*A9	$1,237,500	$1,237,500	$1,237,500		
At$_{LOW}$ At$_{MID}$ At$_{HIGH}$	Containers and container management efficiencies	A5+A10	$2,505,000 $2,797,500 $2,895,000	$2,505,000 $2,797,500 $2,895,000	$2,505,000 $2,797,500 $2,895,000	$7,515,000 $8,392,500 $8,685,000	$6,229,564 $6,956,968 $7,199,437

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Benefit 2: Data Virtualization And Governance Benefits

Interviewed organizations described the following benefits related to data virtualization and governance:

› Data virtualization with Cloud Pak for Data allows companies to "democratize" data accessibility, improving business decisions, value, and the resulting impacts on or increases to the customer experience. Democratized data additionally leads to fewer extract, transform, and load (ETL) requests sent to data engineers from business lines, and fast time to delivery for requests that can be satisfied through virtualization technology.

› Cloud Pak for Data's data virtualization solutions improve data governance and security for companies because the platform integrates access through virtualization with data cataloging, quality, and stewardship capabilities, allowing companies to both develop and enforce policies.

› Through virtualization, companies initially looking to migrate data (e.g., to make it more accessible to data scientists or engineers) may not need to undertake these potentially significant efforts.

Of these, democratized data accessibility, improved data governance and security, and avoided data migration costs are difficult to represent in a financial model for various reasons. For example, we can model benefits for democratized data accessibility (e.g., increased revenue from improved customer experience) and avoided data migration costs (e.g., 10 FTEs for three months), however the magnitude and nature of these use cases are very specific to each individual company. Therefore, we did not include these assumptions and use cases in our composite company.

Improved data governance and security likewise can be modeled (e.g., multiplying the regulatory non-compliance and reputational costs of a data breach with the reduced likelihood of a breach occurring), and while the customers Forrester interviewed recognized Cloud Pak for Data indeed reduced their risk, they were unable to estimate that reduction in likelihood of a breach, and therefore we did not model these benefits.

The projected impact of fewer ETL requests, however, is included in our financial model. Based on the customer interviews, Forrester modeled the financial impact for the composite organization with the following estimates:

› The composite organization has 5 data stores located in different countries.

› For each data store, there is one data engineer responsible for responding to ETL requests from the business lines.

› With Cloud Pak for Data, the composite organization expects ETL requests to be reduced by between 25% and 65%, which allows data engineers to spend more time on higher-value tasks (e.g., innovation).

This yields a three-year projected PV ranging from $466,285 to $1.2 million. The summary table for the low, mid, and high projections is shown below, followed by the detailed calculations for each projection.

Reduced ETL requests:
25% to 65%

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Benefit 2: Data Virtualization And Governance Benefits: Summary Table

REF.	BENEFIT	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Bt$_{LOW}$	Data virtualization and governance benefits (Low)	$187,500	$187,500	$187,500	$562,500	**$466,285**
Bt$_{MID}$	Data virtualization and governance benefits (Mid)	$300,000	$300,000	$300,000	$900,000	**$746,056**
Bt$_{HIGH}$	Data virtualization and governance benefits (High)	$487,500	$487,500	$487,500	$1,462,500	**$1,212,340**

Benefit 2: Data Virtualization And Governance Benefits: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
B1	Number of data stores	Composite organization	5	5	5		
B2	Data engineer FTEs per data store	Composite organization	1	1	1		
B3$_{LOW}$ B3$_{MID}$ B3$_{HIGH}$	Reduced ETL requests (effort reallocated)	Composite organization	25% 40% 65%	25% 40% 65%	25% 40% 65%		
B4	Data engineer fully burdened annual salary	Composite organization	$150,000	$150,000	$150,000		
Bt$_{LOW}$ Bt$_{MID}$ Bt$_{HIGH}$	**Data virtualization and governance benefits**	B1*B2*B3*B4	**$187,500** **$300,000** **$487,500**	**$187,500** **$300,000** **$487,500**	**$187,500** **$300,000** **$487,500**	**$562,500** **$900,000** **$1,462,500**	**$466,285** **$746,056** **$1,212,340**

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Benefit 3: Data Science, Machine Learning, And Artificial Intelligence Benefits

Interviewees described the following benefits related to improved capabilities in data science, machine learning, and artificial intelligence:

› IBM's Cloud Pak for Data platform allows companies to focus their resources on their core competencies instead of building out a similar solution set internally.

› Data scientists are more productive with Cloud Pak for Data, which allows companies to reduce future hiring requirements for data scientists. Working with a tool like Cloud Pak for Data may also reduce employee turnover.

› Cloud Pak for Data allows for easier development of ML and AI models (due to the reduced complexity of their environment), which allows companies to both reduce the top-end salary ranges for future data scientist hires and to increase the speed at which models are developed and deployed to market.

› Given the capabilities provided by Cloud Pak for Data, companies are able to sunset legacy tools that were in place beforehand.

While the avoided cost of internally building a solution that provides similar benefits to Cloud Pak for Data can be quantified (e.g., the price of 10 developers for two years), including this in the financial model would effectively result in "double-counting" of the other benefits.

For reduced data scientist turnover, while the customers Forrester interviewed acknowledged that having access to a platform like Cloud Pak for Data can lead to reduced turnover in their data scientist team, they were unable to estimate that reduction, and therefore we did not model this benefit.

The projected impact of improved data scientist productivity due to Cloud Pak for Data, however, is included in the financial model.

Based on the customer interviews, Forrester modeled the financial impact for the composite organization with the following estimates:

› Before investing in Cloud Pak for Data, the composite organization had already employed five data scientists and was using various data analytical tools, which have a license cost of $5,000 per year per data scientist.

› By the end of Year 3, the composite organization expects to avoid between three and five additional data scientist hires. And the data scientists that were hired were brought on with a salary between 10% and 20% lower than would have otherwise been required due to the complexity of their environment before Cloud Pak for Data.

› With Cloud Pak for Data, the composite organization expects to accelerate the time to market for models from 48 months down to 24 months; as a result, it will be able to bring an additional one and two "high-impact" models to market in Years 2 and 3, respectively. With models resulting in annual revenues between $600,000 and $5 million, this allows for a significant avoidance of opportunity costs that would result from a longer development time.

This yields a three-year projected PV ranging from $1.2 million to $3.4 million. The summary table for the low, mid, and high projections is shown below, followed by the detailed calculations for each projection.
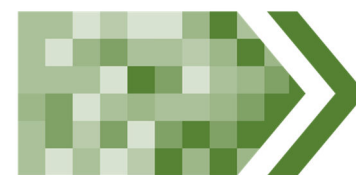
Data science, ML, and AI benefits:
$1.2 million to $3.4 million

While the benefit modeled here is small (in relative terms), the business benefits of improved data science, ML, and AI are potentially much larger than the other modeled benefits.

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Benefit 3: Data Science, Machine Learning, And Artificial Intelligence Benefits: Summary Table

REF.	BENEFIT	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Ct_{LOW}	Data science, machine learning, and artificial intelligence benefits (Low)	$223,000	$496,000	$764,000	$1,483,000	**$1,186,649**
Ct_{MID}	Data science, machine learning, and artificial intelligence benefits (Mid)	$439,000	$761,000	$1,078,000	$2,278,000	**$1,837,934**
Ct_{HIGH}	Data science, machine learning, and artificial intelligence benefits (High)	$673,000	$1,404,000	$2,130,000	$4,207,000	**$3,372,449**

Benefit 3: Data Science, Machine Learning, And Artificial Intelligence Benefits: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
C1	Number of data scientists, with IBM Cloud Pak for Data	Composite organization	5	8	10		
$C2_{LOW}$	Number of data scientists, without IBM Cloud Pak for Data	Composite organization	6	10	13		
$C2_{MID}$			7	11	14		
$C2_{HIGH}$			8	12	15		
$C3_{LOW}$	*Subtotal: Avoided data scientists hires*	*C2 - C1*	*1*	*2*	*3*		
$C3_{MID}$			*2*	*3*	*4*		
$C3_{HIGH}$			*3*	*4*	*5*		
C4	Data scientist fully burdened annual salary, with IBM Cloud Pak for Data	Composite organization	$180,000	$180,000	$180,000		
$C5_{LOW}$	Increased data scientist salary, without IBM Cloud Pak for Data	Composite organization	10%	10%	10%		
$C5_{MID}$			15%	15%	15%		
$C5_{HIGH}$			20%	20%	20%		
$C6_{LOW}$	*Subtotal: Avoided data scientist salary*	*C3*C4*(1+C5), rounded*	*$198,000*	*$396,000*	*$594,000*		
$C6_{MID}$			*$414,000*	*$621,000*	*$828,000*		
$C6_{HIGH}$			*$648,000*	*$864,000*	*$1,080,000*		
C7	Avoided third-party software license costs per data scientist	Composite organization	$5,000	$5,000	$5,000		
$C8_{LOW}$	Annual revenue from high-impact models	Composite organization	$600,000	$600,000	$600,000		
$C8_{MID}$			$1,000,000	$1,000,000	$1,000,000		
$C8_{HIGH}$			$5,000,000	$5,000,000	$5,000,000		
C9	Number of high-impact models delivered to market	Composite organization	0	1	2		
C10	Profit margin	Composite organization	10%	10%	10%		
$C11_{LOW}$	*Subtotal: Avoided opportunity costs*	*C8*C9*C10*	*$0*	*$60,000*	*$120,000*		
$C11_{MID}$			*$0*	*$100,000*	*$200,000*		
$C11_{HIGH}$			*$0*	*$500,000*	*$1,000,000*		
Ct_{LOW}	**Data science, machine learning, and artificial intelligence benefits**	C6+(C1*C7)+C11	$223,000	$496,000	$764,000	$1,483,000	$1,186,649
Ct_{MID}			$439,000	$761,000	$1,078,000	$2,278,000	$1,837,934
Ct_{HIGH}			$673,000	$1,404,000	$2,130,000	$4,207,000	$3,372,449

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Analysis Of Projected Costs

QUANTIFIED PROJECTED COST DATA AS APPLIED TO THE COMPOSITE

Total Projected Costs

REF.	COST	INITIAL	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Dtr	License and professional services costs	$330,625	$57,500	$57,500	$57,500	$503,125	$473,619
Etr	Internal implementation and operation costs	$61,839	$632,500	$632,500	$632,500	$1,959,339	$1,634,773
	Total costs (risk-adjusted)	**$392,464**	**$690,000**	**$690,000**	**$690,000**	**$2,462,464**	**$2,108,392**

Cost 1: License And Professional Services Costs

Interviewed organizations noted the license and professional services costs related to Cloud Pak for Data.

Based on the customer interviews, data from IBM, and the composite organization's deployment size, Forrester modeled the financial impact for the composite organization with the following estimates:

› $250,000 upfront perpetual license for the on-premises deployment of Cloud Pak for Data.

› An annual Subscription & Support fee of $50,000.

› Implementation professional services of $37,500.

This cost can vary due to uncertainty related to:

› Deployment size.

› Required professional services.

To account for these risks, Forrester adjusted this cost upward by 15%, yielding an initial cost of $330,625 and an annual cost of $57,500, with a three-year risk-adjusted total PV of $473,619.

> The table above shows the total of all costs across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the composite organization expects risk-adjusted total costs to have a PV of $2.1 million.

> Implementation risk is the risk that a proposed investment may deviate from the original or expected requirements, resulting in higher costs than anticipated. The greater the uncertainty, the higher the potential costs.

Cost 1: License And Professional Services Costs: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
D1	IBM Cloud Pak for Data license	Composite organization	$250,000			
D2	Subscription & Support fee	Composite organization		$50,000	$50,000	$50,000
D3	Implementation professional services	Composite organization	$37,500			
Dt	License and professional services costs	D1+D2+D3	$287,500	$50,000	$50,000	$50,000
	Risk adjustment	↑15%				
Dtr	**License and professional services costs (risk-adjusted)**		**$330,625**	**$57,500**	**$57,500**	**$57,500**

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Cost 2: Internal Implementation And Operation Costs

Interviewed organizations noted implementation and operational internal costs related to Cloud Pak for Data.

Based on the customer interviews and the composite organization's deployment size, Forrester modeled the financial impact for the composite organization with the following estimates:

› A two-month implementation and ramp-up with two IT FTEs.

› One data engineer to maintain the enterprise metadata.

› Training for data scientists on the new platform.

› Hardware, operational, and maintenance costs totaling $400,000 per year.

This cost can vary due to uncertainty related to:

› Implementation timeline and effort.

› Operational maintenance requirements.

› Hardware costs.

To account for these risks, Forrester adjusted this cost upward by 15%, yielding an initial cost of $61,839 and an annual cost of $632,500, with a three-year risk-adjusted total PV of $1.6 million.

Cost 2: Internal Implementation And Operation Costs: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
E1	Number of months for implementation	Composite organization	2			
E2	Internal IT FTEs for implementation	Composite organization	2			
E3	IT FTE fully burdened annual salary, with Cloud Pak for Data	Composite organization	$130,000			
E4	Internal data engineers to maintain metadata	Composite organization		1	1	1
E5	Data engineer fully burdened annual salary	Composite organization		$150,000	$150,000	$150,000
E6	Training for data scientists (hours)	Composite organization	24			
E7	Number of data scientists	Composite organization	5			
E8	Data scientist fully burdened hourly salary	Annual salary / 2080, rounded	$87			
E9	Hardware, operational, and maintenance costs	Composite organization		$400,000	$400,000	$400,000
Et	Internal implementation and operation costs	(E1*1/12*E2*E3)+(E4*E5)+(E6*E7*E8)+E9	$53,773	$550,000	$550,000	$550,000
	Risk adjustment	↑15%				
Etr	**Internal implementation and operation costs (risk-adjusted)**		**$61,839**	**$632,500**	**$632,500**	**$632,500**

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Financial Summary

CONSOLIDATED THREE-YEAR RISK-ADJUSTED PROJECTED METRICS

Cash Flow Chart (Risk-Adjusted)

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

Three-Year Projected Financial Analysis For The Composite Organization

High impact NPV, $9.7M, PROI of 459%

Medium impact NPV, $7.4M, PROI of 353%

Low impact NPV, $5.8M, PROI of 274%

These risk-adjusted PROI and NPV are determined by applying risk-adjustment factors to the results in each Benefit and Cost section.

Cash Flow Table (Risk-Adjusted)

	INITIAL	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Total costs	($392,464)	($690,000)	($690,000)	($690,000)	($2,462,464)	**($2,108,392)**
Total benefits (Low)	$0	$2,915,500	$3,188,500	$3,456,500	$9,560,500	**$7,882,498**
Total benefits (Mid)	$0	$3,536,500	$3,858,500	$4,175,500	$11,570,500	**$9,540,958**
Total benefits (High)	$0	$4,055,500	$4,786,500	$5,512,500	$14,354,500	**$11,784,226**
Net benefits (Low)	($392,464)	$2,225,500	$2,498,500	$2,766,500	$7,098,036	**$5,774,106**
Net benefits (Mid)	($392,464)	$2,846,500	$3,168,500	$3,485,500	$9,108,036	**$7,432,566**
Net benefits (High)	($392,464)	$3,365,500	$4,096,500	$4,822,500	$11,892,036	**$9,675,834**
PROI (Low)						**274%**
PROI (Mid)						**353%**
PROI (High)						**459%**

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IBM Cloud Pak For Data: Overview

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

### The Artificial Intelligence Ladder

Collect: Make data simple and accessible. Collect data of every type, regardless of where it resides, and bring flexibility in the face of ever-changing data sources.

Organize: Create a business-ready analytics foundation. Organize all data into a trusted, business-ready foundation with built-in governance, protection, and compliance.

Analyze: Build and scale AI with trust and transparency. Analyze data in smarter ways and benefit from AI models that empower organizations to gain new insights and make better, smarter decisions.

Infuse: Operationalize AI throughout the business. Apply AI across the enterprise in multiple departments and within various processes — drawing on predictions, automation, and optimization.

IBM Cloud Pak for Data
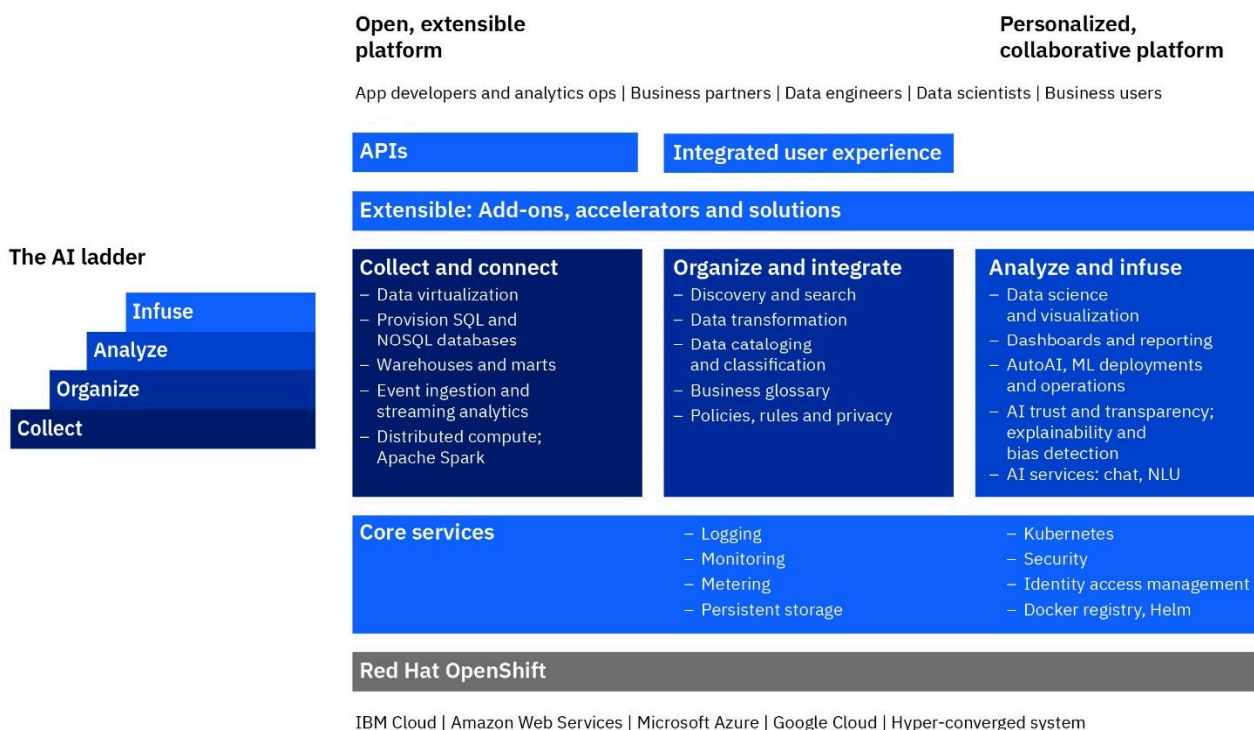
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Appendix A: New Technology: Projected Total Economic Impact

New Technology: Projected Total Economic Impact (New Tech TEI) 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 New Tech TEI methodology helps companies demonstrate and justify the projected tangible value of IT initiatives to both senior management and other key business stakeholders.

Total Economic Impact Approach

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

Projected Costs consider all expenses necessary to deliver the proposed value, or benefits, of the product. The projected cost category within New Tech 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.

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.

Projected return on investment (PROI)

A project's expected return in percentage terms. PROI is calculated by dividing net projected benefits (projected benefits less costs) by projected 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%. A 10% discount rate is used for this analysis.

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.

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