FORRESTER®

The Total Economic Impact™ Of Teradata ClearScape Analytics™

Cost Savings And Business Benefits
Enabled By ClearScape Analytics

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Executive Summary

> Investing in a solution like Teradata ClearScape Analytics is crucial for enterprises as it enables them to responsibly build and maintain machine learning (ML) models for their custom AI/ML solutions. These models play a significant role in improving patient outcomes, identifying patterns in data to enhance operational efficiency, and driving profit. By leveraging ClearScape Analytics, organizations can make data-driven decisions and enhance patient care and innovation.

Teradata VantageCloud, an end-to-end cloud analytics and data platform for AI, is built on cloud-native architecture for fast, flexible deployment at lower total cost of ownership (TCO). ClearScape Analytics is the name for Teradata VantageCloud's analytics capabilities, which are powerful, open, and connected end-to-end AI/ML capabilities.

Teradata commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying ClearScape Analytics.[1] This study aims to provide readers with a framework to evaluate the potential financial impact of ClearScape Analytics on their organizations.
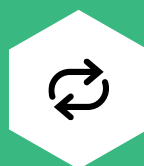
To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed a representative of an organization who has experience using ClearScape Analytics. Forrester used this experience to project a three-year financial analysis.

KEY STATISTICS

Return on investment (ROI)
244%

Net present value (NPV)
$3.1M

Prior to using ClearScape Analytics, the interviewee noted how their organization found it difficult to scale machine learning models in production. Particularly, they found it challenging to keep up with maintenance and governance (e.g., updating feature banks, version control, and managing model drift), and the number of models deployed reached a plateau that they couldn't overcome without adding more FTEs. This prevented them from finding AI/ML opportunities to create new business value. Additionally, the interviewee noted that data movement introduced cost, complexity, security risk, and governance administration to their organization.

After the investment in ClearScape Analytics, the interviewee's organization was able to scale beyond the existing machine learning models while improving its performance, speed up the security approval process, and consolidate the data analytics environment and improve access to in-database analytics. Key results from the investment include improved overall patient outcomes, improved data

Cumulative data scientist time savings with ClearScape Analytics

50%

scientist productivity, and incremental profit growth from data analytics projects.

KEY FINDINGS

Quantified benefits. Three-year, risk-adjusted present value (PV) quantified benefits include the following:

- **Data scientists reduced labor associated with data preparation by 15%, model training by 5%, and model operationalization and maintenance by 30%, representing $713,000 in savings over three years.** ClearScape Analytics increased data scientist productivity across data preparation, model training, and model maintenance. The interviewee noted their healthcare organization reduced data replication and movement issues by keeping large machine learning model data sets in a single environment. Operationalizing models within ClearScape Analytics reduced manual labor maintaining models in production. The time savings that ClearScape Analytics enabled allowed data scientists to build and deploy more models with fewer resources.

- **$125 million in profit from models enabled by ClearScape Analytics with $3.6 million of this profit directly attributed to ClearScape Analytics over three years.** The interviewee noted that ClearScape Analytics enabled the healthcare organization's data analytics team to build and deploy profit-generating data analytics initiatives, recapturing lost data analytic opportunities and enabling greater business value — all with fewer data scientist resources than in the prior environment. The machine learning and data analytics models created in ClearScape Analytics underpinned cross-organization efforts to drive profit through patient marketing models, save costs through predictive volume and staffing, increase charitable donations, and more.

Unquantified benefits. Benefits that are not quantified in this study include:
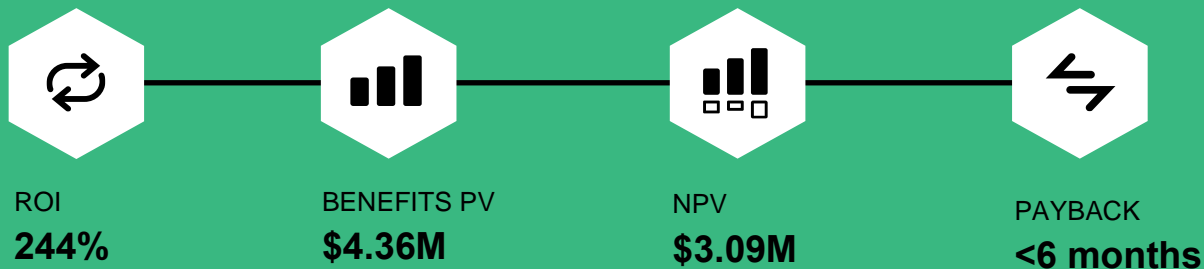
- **Technology licensing, storage, and compute cost savings.** The SVP of enterprise data and analytics told Forrester that adopting ClearScape Analytics was cheaper, easier to justify to internal security and IT stakeholders, and faster to implement than alternatives.

- **Improved data scientist employee experience and retention.** Providing a meaningful employee experience was a crucial goal for the interviewee and their organization, especially considering the costs of recruiting, training, and employing data scientists. ClearScape Analytics allowed the interviewee's organization to reduce manual tasks, increase productivity, and successfully scale models into production, improving the overall data scientist employee experience.

- **Faster time to market.** ClearScape Analytics enabled the SVP of enterprise data and analytics at the healthcare organization to deploy more models into production more frequently and with fewer resources. The interviewee's organization improved operational efficiency and decision-making, increased proactive project risk management, and ensured the scalability of its data analytics initiatives.

- **Improved patient outcomes.** Models built with ClearScape Analytics improved patient population health and outcomes through personalized messaging, proactive and relevant follow-ups, a better understanding of population health, and more.

Costs. Three-year, risk-adjusted PV costs include:

- **ClearScape Analytics costs.** The interviewee noted there were no marginal ClearScape Analytics licensing costs. ClearScape costs were included in the overall Teradata expenditure.

- **Implementation and ongoing costs.** The interviewee's organization incurred costs on two fronts: implementation and ongoing maintenance. Implementation costs consisted of professional services and internal change management, setup, and training costs. Ongoing costs involved dedicating a resource to maintain the environment and support upgrades.

The interview and financial analysis found that the representative's organization experiences benefits of $4.36 million over three years versus costs of $1.27 million, adding up to a net present value (NPV) of $3.09 million and an ROI of 244%.

ROI
244%

BENEFITS PV
$4.36M

NPV
$3.09M

PAYBACK
<6 months

Benefits (Three-Year)

Data scientist productivity	$713.4K
Profit from machine learning models enabled by ClearScape Analytics	$3.6M

"I had six people on the [data science] team in 2019, and we had 25 models running. We weren't really going to go much farther than that because we were pretty much at capacity. Now, I have eight people and we're running 80-plus models and still building more. That gives you an idea of the time [ClearScape Analytics] has freed up."

— SVP of enterprise data and analytics, healthcare

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 ClearScape Analytics.

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 ClearScape Analytics can have on an organization.

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by Teradata 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 study to determine the appropriateness of an investment in ClearScape Analytics.

Teradata 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.

Teradata provided the customer name for the interview but did not participate in the interview.

DUE DILIGENCE
Interviewed Teradata stakeholders and Forrester analysts to gather data relative to ClearScape Analytics.

INTERVIEW
Interviewed the representative of an organization using ClearScape Analytics to obtain data with respect to costs, benefits, and risks.

FINANCIAL MODEL FRAMEWORK
Constructed a financial model representative of the interview using the TEI methodology and risk-adjusted the financial model based on issues and concerns of the interviewee.

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.

INTERVIEWEE'S ORGANIZATION

For this analysis, Forrester interviewed the SVP of enterprise data and analytics representing a healthcare organization. The healthcare organization is a North American-based provider with $5 billion in annual revenue. The organization employs over 25,000 employees, including more than 5,000 physicians.

KEY CHALLENGES

Before using ClearScape Analytics, the interviewee's organization had no alternative solutions and noted how their organization struggled with several challenges, including the following:

- **Difficulty scaling machine learning models into production**. The interviewee noted that large data sets had to be moved between different systems in the healthcare organization's prior environment. Models were being trained on personal laptops, which delayed running and processing time. Model maintenance and governance, such as updating feature banks, managing version control, and preventing model drift, took up a significant amount of data scientist time. This limited the number of models that data scientists could build and deploy.

  The SVP of enterprise data and analytics told Forrester: "The problem we really ran into was maintenance and version control. It was a governance and maintenance nightmare. I had good people, they documented, but even still, that became more the work rather than doing new things."

- **Data movement introduced security risk and governance administration.** In its prior environment, the interviewee said their healthcare organization faced security and governance scrutiny when transferring large data

Key Assumptions

- **$5 billion annual revenue**
- **25,000 employees**
- **8 data scientists**

sets between multiple solutions. The SVP of enterprise data and analytics said: "We always have to deal with PHI [protected health information]. Anytime you pull data down or move it to a system, that creates headaches. Teradata was always our back end. Our real goal was not to have to replicate the data in multiple places and to keep everything inside the HITRUST environment."

WHY CLEARSCAPE ANALYTICS?

The interviewee cited the following reasons for investing in ClearScape Analytics:

- Improve patient experience of care, improve the health of populations, and reduce the per capita cost of healthcare.

- Scale model deployment and operationalization.

- Streamline solution adoption by expediting security approval.

- Consolidate data analytics environment and access in-database functions to avoid data movement and associated administration security considerations.

- Streamline data scientist productivity and offer integrations to other tools.

- Enable responsible AI to bolster accountability and compliance and positively impact customers and employees.

DATA ANALYTICS AND AI/ML USE CASES

The interviewee's healthcare organization is an existing Teradata customer, including Teradata enterprise warehouse, and utilizes Teradata ClearScape Analytics to prepare, train, and deploy machine learning models into production. The healthcare organization has over 300 users of Teradata, a core analytics team of 40 FTEs, and eight data scientists who directly work with ClearScape Analytics.

The SVP of enterprise data and analytics leads initiatives to incorporate data analytics and machine learning to improve patient personalization and outcomes, drive revenue, improve decision-making, and more. The interviewee noted their healthcare organization currently has over 80 models in production across patient personalization and marketing, supply chain, finance, and forecasting, clinical, and donor outreach. Core use cases for machine learning models operationalized through ClearScape Analytics included:

- **Real-time recommendation engine for patient coordination referrals to specialists.** This use case included marketing models developed to analyze general population data to identify existing patients with underlying conditions, such as back pain. The patients were then scored in terms of the necessity of treatment and sent customized outreach messaging to in-network healthcare specialists. The healthcare organization improved network efficiency by a factor of 40%. This improved patient care, increased marketing campaign success, and drove revenue.

- **Personalized patient messaging and real-time content delivery.** The healthcare organization built models to engage patients in their treatment plans by identifying patients who recently visited the emergency department and applying analytics to create follow-up messaging for ongoing follow-ups and treatment.

- **Risk population.** Risk population models were used to identify patients who were at risk of certain conditions, such as diabetes and hypertension, informing providers at the point of care for proactive management.

- **Predictive supply chain management.** The healthcare organization built models to optimize inventory supply chain efficiencies, such as measuring the time vendors took to deliver medical supplies.

- **Donor outreach.** The healthcare organization developed models to identify donors most likely to donate and reached out at the most opportune time, increasing net-new donations.

Forrester has modeled benefits and costs for this use case over three years.

> **"When we looked at what ClearScape Analytics had to offer, we realized we could save on the processing time just because we could do in database functions that we couldn't necessarily do if we were using a third-party tool against the database."**
>
> *SVP of enterprise data and analytics, healthcare*

Analysis Of Benefits

Quantified benefit data

Total Benefits

Ref.	Benefit	Year 1	Year 2	Year 3	Total	Present Value
Atr	Data scientist productivity	$286,875	$286,875	$286,875	$860,625	$713,416
Btr	Profit from machine learning models enabled by ClearScape Analytics	$720,000	$1,440,000	$2,400,000	$4,560,000	$3,647,784
	Total benefits (risk-adjusted)	$1,006,875	$1,726,875	$2,686,875	$5,420,625	$4,361,200

DATA SCIENTIST PRODUCTIVITY

Evidence and data. ClearScape Analytics increased data scientist productivity across data preparation, model training, and model maintenance. The interviewee noted their healthcare organization reduced data replication and movement issues by keeping large machine learning model data sets in a single environment. Data scientists received incremental time savings by integrating preexisting model training solutions like Python and training models using Teradata resources instead of on their computers, allowing them to run multiple workloads in parallel. The healthcare organization saw the most significant savings with model maintenance. The time savings that ClearScape Analytics created allowed data scientists to build and deploy more models with fewer resources.

- The SVP of enterprise data and analytics told Forrester: "From the data science perspective, not having to move data around to another system is a pretty big savings. Running or training algorithms on larger data sets saves time because it's done inside the environment."

- The interviewee also said: "The ModelOps, that's what I'd call the maintenance piece, saved a good 30% of the data scientist's time. People forget, once you deploy something, machine learning means it will always need to be monitored, updated, retrained, and validated."

- The SVP of enterprise data and analytics stated: "[ClearScape Analytics helped us] move beyond the 25 models and not really having to expand my staff, which has been a big deal, especially maintaining the feature banks. Maintaining the feature banks allows my data scientists to build models quickly because they don't have to refactor who's a diabetic or who's on this medication or 500 other features. That's really sped us up."

> **"Each model we built before [ClearScape Analytics] would take close to 10% to 15% of someone's time doing maintenance. If you had a person who built 10 models, they'd be pretty much fully booked. With ClearScape Analytics, it probably takes them 2% of their time when we deploy a new model."**
>
> *SVP of enterprise data and analytics, healthcare*

Modeling and assumptions. In modeling this benefit for the interviewee's organization, Forrester assumes the following:

- There are eight data scientists as part of the greater data analytics team who actively use ClearScape Analytics.

- Data scientists save 15% of their total time during the data preparation stage using ClearScape Analytics as compared to their previous environment.

- Data scientists save 5% of their total time during the machine learning model training stage using ClearScape Analytics.

- Data scientists save 30% of their total time during the model operations and maintenance stage using ClearScape Analytics.

- In summation, data scientists save 50% of their total time using ClearScape Analytics.

- The annual data scientist fully burdened rate is $168,750.

- Forrester applies a 50% productivity recapture rate to denote the amount of saved time reinvested into other productive areas.

Risks. The expected financial impact is subject to risks and variation based on several factors, including:

- Technological implementation, integration, data quality fit and availability, and scalability risks.

- Data scientist training, expertise, and cost.

Results. To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of $713,000.

Data Scientist Productivity					
Ref.	Metric	Source	Year 1	Year 2	Year 3
A1	Number of data scientists using ClearScape analytics	Interview	8	8	8
A2	Reduction in total labor from data preparation efficiency	Interview	15%	15%	15%
A3	Reduction in total labor from model training	Interview	5%	5%	5%
A4	Reduction in total labor from model operationalization and maintenance	Interview	30%	30%	30%
A5	Cumulative data scientist time savings with ClearScape Analytics	A2+A3+A4	50%	50%	50%
A6	Data scientist fully burdened annual rate	TEI standard	$168,750	$168,750	$168,750
A7	Productivity recapture	TEI standard	50%	50%	50%
At	Data scientist productivity	A1*A5*A6*A7	$337,500	$337,500	$337,500
	Risk adjustment	↓15%			
Atr	Data scientist productivity (risk-adjusted)		$286,875	$286,875	$286,875
	Three-year total: $860,625		**Three-year present value: $713,416**		

PROFIT FROM MACHINE LEARNING MODELS ENABLED BY CLEARSCAPE ANALYTICS

Evidence and data. The interviewee noted that ClearScape Analytics enabled the healthcare organization's data analytics team to build and deploy profit-generating data analytics initiatives with fewer resources compared to the prior environment. The machine learning and data analytics models created in ClearScape Analytics underpinned cross-organization efforts to drive profit through patient marketing models, save costs through predictive volume and staffing, increase charitable donations, and more. See the Data Analytics And ML/AI Use Cases section for more detail about the core machine learning use cases with machine learning models deployed with ClearScape Analytics.

- The marketing models to personalize patient referrals to in-network specialists were a large profit driver for the healthcare organization. The SVP of enterprise data and analytics told Forrester: "For our referral side, where we're making certain that when a referral is made to a cardiologist, we're suggesting people that are in network, versus the tool we were using before, which was a third-party tool. We've been able to change network efficiency by a factor of 30% to 40%. That is worth close to $80 million in margin to our organization."

- The interviewee noted that their healthcare organization improved its marketing email open rate from 2% to 46% by improving targeted messaging and timing.

Modeling and assumptions. In modeling this benefit for the interviewee's organization, Forrester assumes:

- In Year 1, there is $37.5 million of total profit driven by data analytics projects such as personalized patient marketing, patient referrals to specialists, and donor outreach. This scales to $75 million in Year 2 and reaches $125 million in Year 3. The profit year-over-year growth is correlated to the number of models in production, which scales from 25 in Year 1 to 50 in Year 2 and 84 in Year 3.

- Cross-organizational efforts drive the total profit. Of these profits, 12% is directly attributable to the analytics team.

- Of the profit attributable to the analytics team, 20% was directly realized using ClearScape Analytics.

Risks. The expected financial impact is subject to risks and variation based on several factors, including:

- Types of data analytics initiatives projects.

- Analytics team expertise and ability to scale models into production.

- Cross-organizational buy-in, change management, and transformation to support new revenue-generating initiatives.

Results. To account for these risks, Forrester adjusted this benefit downward by 20%, yielding a three-year, risk-adjusted total PV of $3.6 million.

Profit from machine learning models directly attributable to ClearScape Analytics

$3.6 million

Profit From Machine Learning Models Enabled By ClearScape Analytics					
Ref.	**Metric**	**Source**	**Year 1**	**Year 2**	**Year 3**
B1	Profit driven by data analytics projects such as personalized patient marketing, patient referrals to specialists, and donor outreach	Interview	$37,500,000	$75,000,000	$125,000,000
B2	Attribution of profit lift to the analytics team	Interview	12%	12%	12%
B3	Profit attributable to analytics projects	B1*B2	$4,500,000	$9,000,000	$15,000,000
B4	Attribution of profit driven by ClearScape Analytics	Interview	20%	20%	20%
Bt	Profit from machine learning models enabled by ClearScape Analytics	B3*B4	$900,000	$1,800,000	$3,000,000
	Risk adjustment	↓20%			
Btr	Profit from machine learning models enabled by ClearScape Analytics (risk-adjusted)		$720,000	$1,440,000	$2,400,000
	Three-year total: $4,560,000		**Three-year present value: $3,647,784**		

UNQUANTIFIED BENEFITS

The interviewee mentioned the following additional benefits that their organization experienced but was not able to quantify:

- **Technology licensing, storage, and compute cost savings.** The SVP of enterprise data and analytics told Forrester that adopting ClearScape Analytics was cheaper, easier to justify to internal security and IT stakeholders, and faster to implement than alternatives. They said: "ClearScape Analytics was in the low $200,000 range. When I looked at an [alternative software-as-a-service] (SaaS) product, they were quoting $1.1 million … and none of that included the up-down egress, cost of dropping ingress and egress, cost of the cloud that would set it up, or the hassle to get my security and IT team to approve it and get it through. [ClearScape Analytics] is much cheaper from that perspective."

  The SVP of enterprise data and analytics added that getting approval for an alternative cloud solution would delay implementation. They said:

"I would have probably been waiting two years to get security approval. It's still about a six- to nine-month approval process to get that into a cloud environment. Since I already had Teradata as an approved product, that gave it an advantage."

- **Improved data scientist employee experience and retention.** Providing a meaningful employee experience was a crucial goal for the interviewee's organization, especially considering the costs of recruiting, training, and employing data scientists. ClearScape Analytics allowed the SVP of enterprise data and analytics to reduce manual tasks, increase productivity, and successfully scale models into production, improving the overall data scientist employee experience at their healthcare organization. The interviewee said: "I don't necessarily care as much that [model deployment] saved the data scientists 30% of their time as much as I care that they're happier and they're going to stay with the company longer because they're getting to do new things each month."

- **Faster time to market.** ClearScape Analytics enabled the interviewee's organization to deploy

more models into production more frequently and with fewer resources. The interviewee noted their organization improved operational efficiency and decision-making, increased proactive project risk management, and ensured the scalability of its data analytics initiatives. Ultimately, ClearScape Analytics helped drive the faster adoption of personalized patient healthcare, reduction in the cost of healthcare, and improved patient health.

- **Improved patient outcomes.** Models built with ClearScape Analytics improved patient population health and outcomes through personalized messaging, proactive and relevant follow-ups, a better understanding of population health, and more.

FLEXIBILITY

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

Cross-organizational buy-in for future data analytics projects. ClearScape analytics contributed to the data analytics' successful building, deployment, and maintenance of machine learning models and their overarching projects. This helped maintain the trust the SVP of enterprise data and analytics built with their organization. ClearScape Analytics contributed to cross-organizational buy-in of future data and analytics projects by demonstrating project success and improving data scientist capacity.

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

Total Costs

Ref.	Cost	Initial	Year 1	Year 2	Year 3	Total	Present Value
Ctr	ClearScape Analytics cost	$0	$262,500	$262,500	$262,500	$787,500	$652,799
Dtr	Implementation and ongoing costs	$213,864	$88,594	$227,097	$177,188	$706,742	$615,211
	Total costs (risk-adjusted)	$213,864	$351,094	$489,597	$439,688	$1,494,242	$1,268,010

CLEARSCAPE ANALYTICS COST

Evidence and data. For the interviewee's organization, there were no marginal ClearScape Analytics licensing costs. ClearScape Analytics costs were included in the overall Teradata expenditure.

Modeling and assumptions. In modeling this cost for the interviewee's organization, Forrester assumes the following:

- The interviewee's organization does not pay additional fees for ClearScape Analytics but attributes $250,000 worth of its total Terada expenditures to ClearScape Analytics.

- Pricing may vary. Contact Teradata for additional details.

Risks. The expected financial impact is subject to risks and variation based on several factors, including:

- The scope and breadth of total Teradata usage and costs.

- Other hardware and software considerations.

Results. To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of $653,000.

ClearScape Analytics Cost

Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
C1	ClearScape Analytics allocation of total Teradata expenditure	Interview		$250,000	$250,000	$250,000
Ct	ClearScape Analytics cost	C1		$250,000	$250,000	$250,000
	Risk adjustment	↑5%				
Ctr	ClearScape Analytics cost (risk-adjusted)		$0	$262,500	$262,500	$262,500
	Three-year total: $787,500			Three-year present value: $652,799		

IMPLEMENTATION AND ONGOING COSTS

Evidence and data. The interviewee's organization incurs costs on two fronts: implementation and ongoing maintenance. Implementation costs consisted of professional services and internal change management, setup, and training costs. Ongoing costs involved dedicating a resource to maintain the environment and support upgrades.

Modeling and assumptions. In modeling this cost for the interviewee's organization, Forrester assumes the following:

- The interviewee's organization incurs a $100,000 initial professional services cost for implementation support. They incur another $80,000 cost in Year 2 for a significant upgrade.

- All eight data scientists who are active ClearScape Analytics users spend 115 hours of change management and setup time to reach full productivity with ClearScape Analytics during the implementation period. They spend another 15 hours of change management each in Year 2 to support a significant upgrade.

- They spend a total of 45 hours of training and use a "train the trainer" approach.

- The data scientist's hourly fully burdened rate is $81 or $168,750 annually.

- The participant organization dedicates a total of 0.5 data warehouse administrator FTE in Year 1, 0.75 FTE in Year 2, and 1 FTE in Year 3 for ongoing maintenance.

- The data warehouse administrator's annual fully burdened rate is calculated equally to the data scientist rate at $168,750.

Risks. The expected financial impact is subject to risks and variation based on several factors, including:

- Professional services fees.

- Implementation resources skills, expertise, and overhead costs.

- Maintenance and upgrade requirements.

Results. To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year, risk-adjusted total PV of $615,000.

Implementation And Ongoing Costs

Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
D1	Professional services cost	Interview	$100,000		$80,000	
D2	Number of data scientists	Interview	8		8	
D3	Hours of change management and setup time per data scientist	Interview	115		15	
D4	Hours of training per data scientist	Interview	45		0	
D5	Data scientist hourly fully burdened rate	TEI standard	$81		$81	
D6	Subtotal: Implementation and training costs	D1+(D2*(D3+D4)*D5)	$203,680	$0	$89,720	$0
D7	Number of FTEs required for ongoing maintenance	Interview		0.50	0.75	1.00
D8	Data warehouse administrator annual fully burdened rate	TEI standard		$168,750	$168,750	$168,750
D9	Subtotal: Ongoing maintenance	D7*D8		$84,375	$126,563	$168,750
Dt	Implementation and ongoing costs	D6+D9	$203,680	$84,375	$216,283	$168,750
	Risk adjustment	↑5%				
Dtr	Implementation and ongoing costs (risk-adjusted)		$213,864	$88,594	$227,097	$177,188
	Three-year total: 706,742			**Three-year present value: $615,211**		

Financial Summary

CONSOLIDATED THREE-YEAR RISK-ADJUSTED METRICS

Financial Analysis (risk-adjusted)

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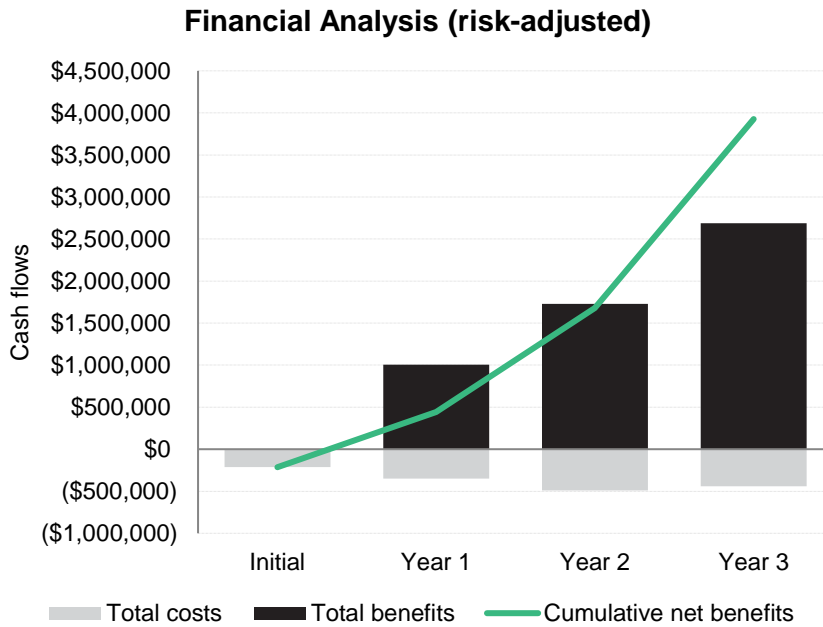
The financial results calculated in the Benefits and Costs sections can be used to determine the ROI, NPV, and payback period for the organization's investment. Forrester assumes a yearly discount rate of 10% for this analysis.

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	($213,864)	($351,094)	($489,597)	($439,688)	($1,494,242)	($1,268,010)
Total benefits	$0	$1,006,875	$1,726,875	$2,686,875	$5,420,625	$4,361,200
Net benefits	($213,864)	$655,781	$1,237,278	$2,247,188	$3,926,383	$3,093,190
ROI						244%
Payback						<6 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: Endnotes

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[1] 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.