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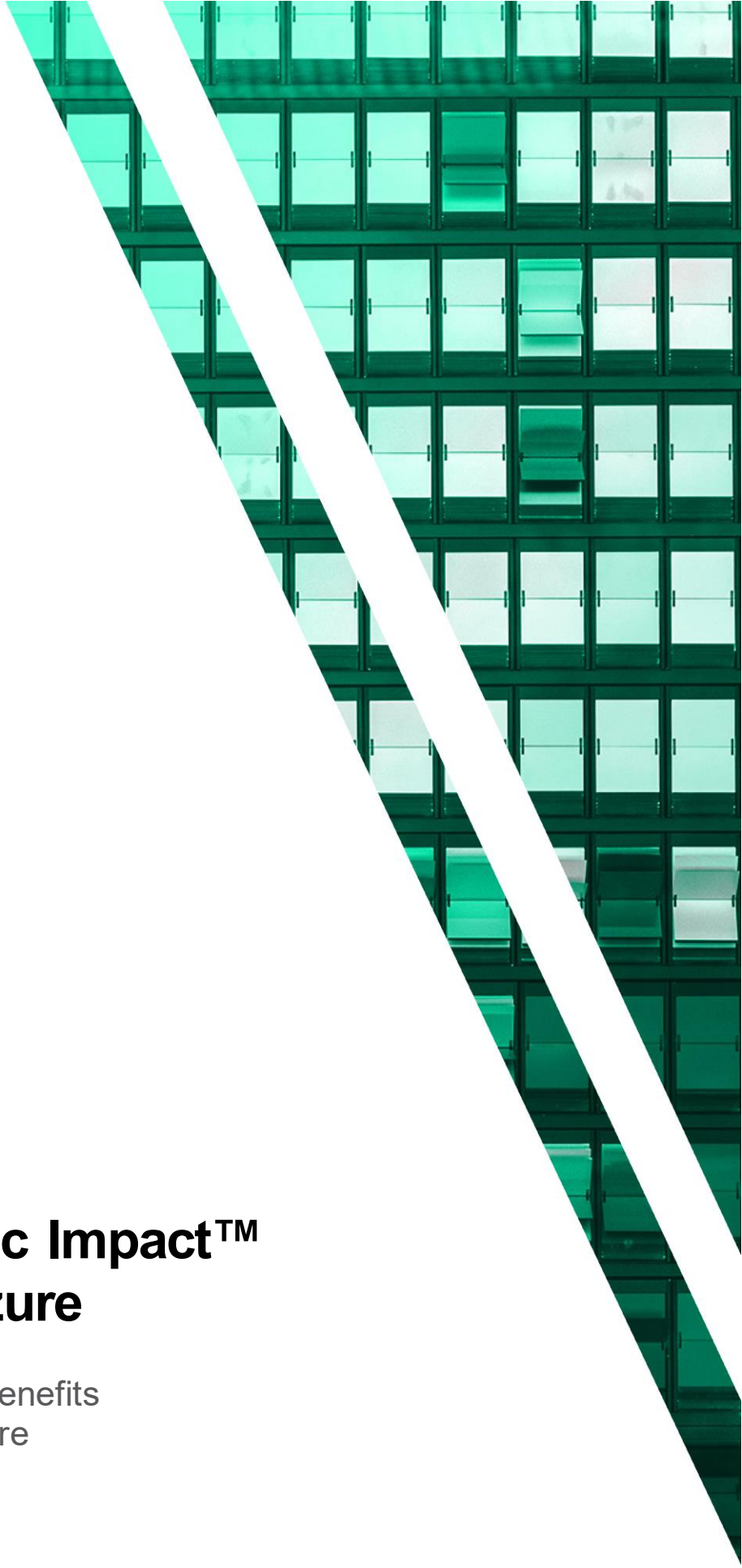

The Total Economic Impact™ Of SAS Viya On Azure

Cost Savings And Business Benefits Enabled By SAS Viya On Azure

MARCH 2022

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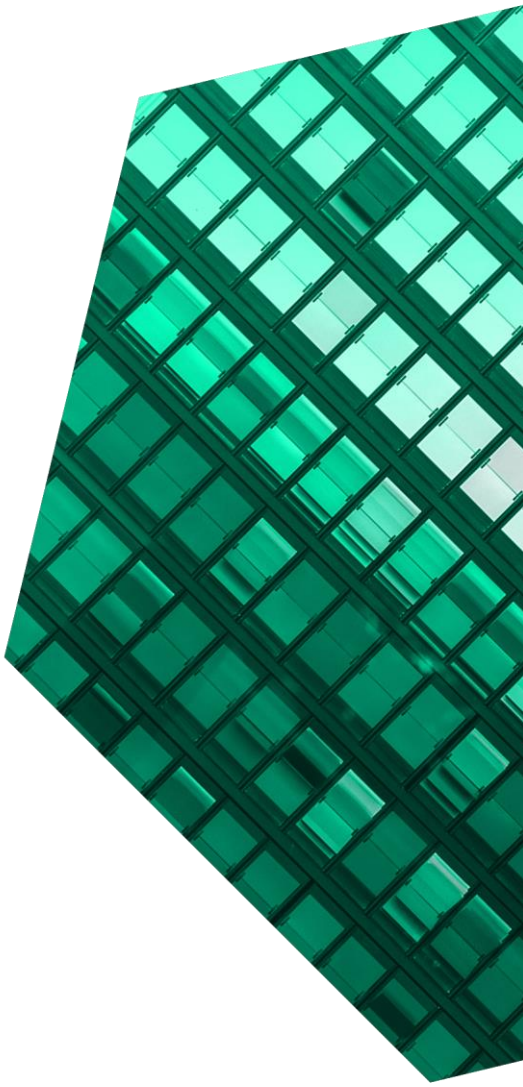


Executive Summary

Robust business analytics capabilities can make organizations better, help them make more informed decisions, and achieve a variety of goals. Running analytics capabilities on cloud technology multiplies its potential impact. Cloud is more than just a technology transformation driver. It is a business transformation accelerator. A cloud ecosystem can generate analytics of aggregated information, using the network for smarter processes and improved decision making.[1]

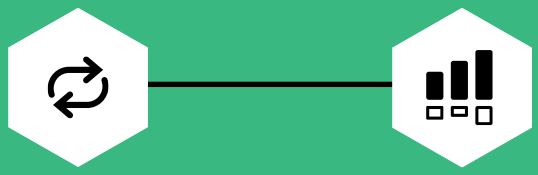
SAS Viya on Azure is an AI, analytic, and data management platform with a cloud-native architecture. This collaboration addresses a market need as various organizations seek to migrate to the cloud to drive operational efficiencies. With Azure being the preferred cloud provider, SAS Viya on Azure allows data, analytics, and machine learning (ML) workloads to fit in natively with cloud services.

Microsoft and SAS commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying SAS Viya on Azure.[2] The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of SAS Viya on Azure on their organizations.

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed nine decision-makers at six organizations with experience using SAS Viya on Azure. For the purposes of this study, Forrester aggregated the interviewees' experiences and combined the results into a single composite organization.

Prior to using SAS Viya on Azure, these interviewees noted how their organizations were either doing analytics with disparate data sources on manual spreadsheets or working with an on-premises infrastructure that was hard to scale and costly to maintain. As a result, prior attempts yielded limited success, leaving them with an inefficient analytics capability, challenges in attempts to scale the infrastructure for other business use cases, and issues with server disruptions and platform stability. This led to the limited use of analytics, as model building and model management was more of a time and cost burden, rather than a growth engine that it had the potential to be.

KEY STATISTICS



Return on investment (ROI)
204%

Net present value (NPV)
$4.28M

After the investment in SAS Viya on Azure, the interviewees benefitted from their migration to the cloud with better infrastructure availability and performance, more efficient operations, and scalability to new use cases. Key value from the investment included faster time-to-market for usable analytics insights, improved decision-making, employee time savings in model development and management, and cost savings from migrating to cloud infrastructure, as well as the flexibility to scale up capabilities as needed.

"[SAS Viya on Azure] gives the opportunity to develop new analytics capabilities that we can realize faster time-to-value than if we had an on-premises analytics infrastructure."
Head of banking analytics, banking

KEY FINDINGS

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

- **Faster time-to-market for analytics insights.** Interviewees shared that using SAS Viya on Azure improved their organizations' ability to generate analytics results faster. This means business users and relevant stakeholders who relied on these analytic insights, can make more informed, data-driven decisions. Prior to SAS Viya on Azure, they wasted time waiting for the analytics team to bring the insights and results to them. Over three years, the faster time to market is worth almost $3.9 million to the composite organization.
- **Improved operational efficiency in model building, testing, and management.** Interviewees noted that using SAS Viya on Azure made their organizations' model development and management of analytics processes more efficient. Building a catalog for registering and managing the organizations' models means time saved from not having to create this catalog from scratch. Automation in updating models with the most recent data means eliminating manual work of employees going into each model and updating them manually. Over three years, the improved operational efficiency is worth more than $1.2 million to the composite organization.
- **Cost savings from retiring on-premises analytics infrastructure.** Interviewees noted their organizations realized cost savings from retiring their on-premises infrastructure. This meant no longer paying for the maintenance and operation of the on-premises environment, such as the server, storage, data centers, and the related software. Over three years, this resulted in cost savings of over $1.3 million to the composite organization, which initially spent $600,000 per year for its on-premises analytics environment.

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

- **Business growth and expansion opportunities from better analytics.** Interviewees believed that the analytics activities SAS Viya on Azure enabled would not be possible in their previous environments. These new capabilities opened up new insights that contributed to new products, new revenue streams, and overall topline and business growth. Interviewees targeted new customer segments due to their analytics insights. Interviewees that were in the banking industry increased the credit limits they offered customers, attracting more customers to their business. They identified less risky customers, made better business decisions, and thus reduced default rates. Some interviewees noted their manufacturing companies improved their fraud management for warranty claims due to analytics from SAS Viya on Azure, saving them as much as $3.2 million per year.
- **Flexibility and scalability of the analytics environment.** Interviewees shared that being able to quickly install SAS Viya on Azure and expand its use case to other business units as needed introduced a level of flexibility and

scalability to their analytics environment. They believed this was a differentiator to their competitors as they uncovered new insights faster. Interviewees shared that, without the quickness and easiness in installing SAS Viya on Azure, they could easily lose the market opportunity and the corresponding additional revenue they could have collected based on the insights from SAS Viya on Azure.

- **Real-time impact.** Interviewees shared that generating insights and making decisions in real time was crucial. Government entities quickly responded to the needs of their population, while manufacturers quickly identified potential supply chain problems. Banks assessed new market opportunities based on real-time understanding of their customers.
- **Partnership and support from the integration of SAS and Microsoft.** Interviewees highlighted their trust in both SAS and Microsoft playing a key role in their decision to invest in a technology based on the partnership and collaboration between SAS and Microsoft. They noted envisioning their improved analytics capabilities as playing a key role in a larger business transformation, so the fact that this transformation is guided by SAS and Microsoft gives them confidence on their path forward.
- **Investment to shaping a data-driven organization.** Interviewees shared that their investment in SAS Viya on Azure was an investment in future benefits that they can realize based on the operational efficiency, time savings, and increase productivity benefits they are able to generate. Interviewees noted that as they continue to treat SAS Viya on Azure as an integral piece of their decision-making process, the better quality insights that can be uncovered will gradually allow organizations to make more informed, data-driven decisions that will benefit them in the long run.

Costs. Risk-adjusted PV costs include:

- **Fees paid for SAS Viya on Azure.** The size and nature of the SAS Viya on Azure deployment determines the fees that an organization pays for its investment. The composite organization pays $295,000 per year.
- **Internal cost related to implementation.** Interviewees allocated a small number of employees to implement of SAS Viya on Azure. This typically involved the migration of data from any on-premises infrastructure to the cloud, the development and migration of models that will be put into production, and training users. For the composite organization, this cost is less than $822,000 over three years.
- **Internal cost related to ongoing support and management.** Once SAS Viya on Azure was in place, ongoing support and management typically involved continuous development of the analytics environment, knowledge sharing with other business users, and periodic engagement with the SAS team on best practices and updates. For the composite organization, this cost is less than $503,000 over three years.

The decision-maker interviews and financial analysis found that a composite organization experiences benefits of $6.37 million over three years versus costs of $2.10 million, adding up to a net present value (NPV) of $4.28 million and an ROI of 204%.

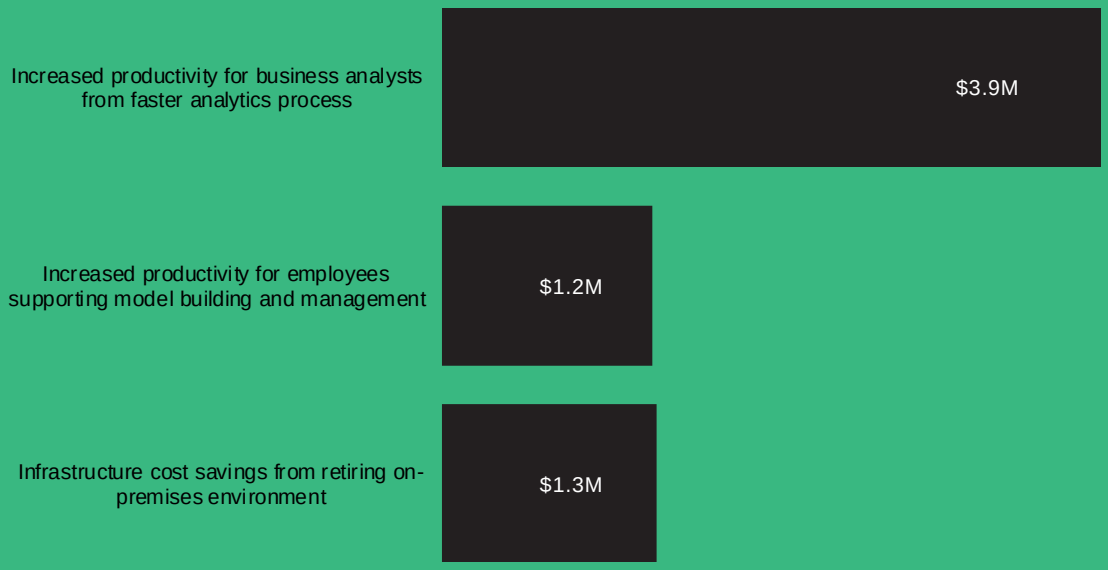
ROI
204%

BENEFITS PV
$6.37M

NPV
$4.28M

PAYBACK
14 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 the SAS Viya on Azure.

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 SAS Viya on Azure can have on an organization.

DUE DILIGENCE

Interviewed SAS stakeholders and Forrester analysts to gather data relative to the SAS Viya on Azure.

DECISION-MAKER INTERVIEWS

Interviewed nine decision-makers at six organizations using the SAS Viya on Azure to obtain data with respect to costs, benefits, and risks.

COMPOSITE ORGANIZATION

Designed a composite organization based on characteristics of the interviewees' 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 decision-makers.

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.

The SAS Viya On Azure Customer Journey

Drivers leading to the SAS Viya on Azure investment

Interviewed Decision-Makers

Interviewee	Industry	Region	Number of employees
CIO	Public sector	North America	1,000
Analytics manager	Manufacturing	Global	5,000
Analytics engineer	Manufacturing	Global	5,000
Superintendent	Banking	South America	32,000
Senior manager of payments	Banking	South America	32,000
CTO	IT professional services	Global	10-30
Business strategist	IT professional services	Global	10-30
Quality product specialist	Manufacturing	Global	35,000
Head of analytics	Banking	Europe	9,000

KEY CHALLENGES

The interviewees' organizations used SAS Viya on Azure for their analytics work, which can mean different things to different organizations. At the core of the issue, analytics work means analyzing a large set of data to uncover insights and trends that can inform business decisions. Prior to investing in SAS Viya on Azure, interviewees shared that they would conduct analytics using manual spreadsheets with some organizations linking different data sources using programming languages like Python or Java. Larger organizations would have a more established analytics environment that is on-premises. This means having to install and manage servers, storage, and data centers.

The interviewees noted how their organizations struggled with common challenges, including:

- **The high cost of maintaining an on-premises analytics infrastructure.** Interviewees noted that having an on-premises analytics infrastructure was costly. Organizations often invested large amounts of capital in physical servers and data centers, as well as the additional expenses of annual maintenance fees, on-premises security

> **"The quantity of data became really big, [where] it was impossible to manage without a specific analysis tool. Our spreadsheet was limited to 60,000 rows, while our data is about 1 million to 2 million rows."**
> *Quality product specialist, manufacturing*

appliances purchases, and real-estate costs for the infrastructure. The head of analytics in banking shared: "Our whole infrastructure was developed on on-premises servers. The procurement process and the cost to acquire this infrastructure was very high, so we decided to develop the new infrastructure on cloud."

- **Operational inefficiency and a high degree of manual processes in the previous analytics environment.** Interviewees shared that their organizations' previous environments often required a lot of manual work from their employees, making the process very inefficient. They would often have employees manually input data and update models, which were very time-consuming activities with a high risk of errors. The CIO in the public sector noted: "We have a lot of systems that don't talk to each other. We could not get a clear picture and had [someone] go to different places and manually coordinate a response."
- **Challenges in scaling capabilities as the amount of data to be analyzed continued to grow.** Interviewees reported challenges when having to scale their on-premises environments. As their business grew, the amount of data that needs to be analyzed grew as well. Scaling on-premises infrastructure would mean forecasting demand capacity, waiting until the next financial period to procure additional capacity, and not being able to downscale if they overprovisioned resources. The senior manager of payments in banking said: "It was hard to scale our on-premises environments as the number of data grew. We analyze 3.5 million invoices to come to a decision about each credit limit. It would be impossible [with our previous environment]."

"The primary pain point with our previous environment was instability caused by our usage pattern. We put all the data we have, and we reached the point where we couldn't expand anymore."
Analytics manager, manufacturing

SOLUTION REQUIREMENTS

The interviewees' organizations searched for a solution that could:

- **Run as cloud technology.** Interviewees shared that they were looking for a cloud technology provider, first and foremost. The CIO in the public sector noted: "We are trying to move as many things as we can to the cloud. The cloud enables us to have information right when they need it. We can make architecture changes quickly and easily, which would be much more difficult with an on-premises installation."
- **Integrate well with different skill sets and open source data.** Interviewees shared their need for a solution that could easily work with the existing knowledge in the current environment. The head of analytics in banking noted: "SAS Viya allows us to utilize open source coding and capabilities. Many of our new team members are not trained on SAS software. By enabling them to utilize open source coding, they can contribute directly to our work."
- **Be positioned as a transformation partner, rather than software vendor.** Interviewees noted seeking a partner to help guide them through the business transformation they were embarking on. The quality product specialist in manufacturing noted: "The culture of data at our company is still at its beginning, so it is really important [to have a partner like SAS and

Microsoft]. We did not want to outsource the work because we wanted to build internal capabilities for our analytics."

"SAS Viya on Azure had features that we wanted to take advantage of. Data scientists could do modeling in the analytics and create a competition of different models. We can then determine which model is the most accurate."
Business strategist, IT professional services

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 nine decision-makers at six organizations 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 has operations across the globe. Its annual revenue is $1 billion. The composite organization consists of 2,000 employees with 100 people on the analytics team. It uses SAS Viya on Azure for mission-critical analytics to make actionable decisions around creating new revenue streams, managing operational costs, and improving customer engagements, product innovations, and go-to-market (GTM) strategies.

Deployment characteristics. Prior to implementing SAS Viya on Azure, the composite organization invests in an on-premises analytics infrastructure with servers, storage, and data centers. As SAS Viya on Azure is implemented, the on-premises infrastructure is gradually retired with a 50% reduction in Year 1, and a full decommissioning in Year 2 and 3.

Key assumptions

- **$1 billion in annual revenues**
- **2,000 total employees**
- **100 people on analytics team — 10 data scientists and 90 business analysts**
- **Global operations**
- **SAS Viya on Azure used for mission-critical analytics to make actionable business decisions**

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	Increased productivity for business analysts from faster analytics process	$556,875	$1,737,450	$2,574,000	$4,868,325	$3,876,043
Btr	Increased productivity for employees supporting model building and management	$180,000	$561,600	$806,400	$1,548,000	$1,233,629
Ctr	Infrastructure cost savings from retiring on-premises environment	$310,500	$621,000	$621,000	$1,552,500	$1,262,062
	Total benefits (risk-adjusted)	$1,047,375	$2,920,050	$4,001,400	$7,968,825	$6,371,734

INCREASED PRODUCTIVITY FOR BUSINESS ANALYSTS FROM FASTER ANALYTICS PROCESS

Evidence and data. Interviewees noted that, with SAS Viya on Azure, their organizations' end-to-end analytics process was faster. Offering best practice model building templates and automated modeling process helped organizations start quickly with ML tasks and scale up use and adoption of analytics across business units. The ability to connect and integrate with various data sources and open source code also contributed to this faster time-to-market. The computing capacity and availability of SAS Viya on Azure compared to manual spreadsheets or physical on-premises infrastructure drove insights and results to end users faster. Finally, the democratization of analytics that allowed nontechnical employees to use the platform and generate insights themselves enabled them to gather insights and findings faster without creating a backlog for the data scientists.

- The head of analytics in banking said: "Certain analytics operations that used to take us one week, now can be completed in one day with SAS Viya on Azure. So, now that you analyze things faster, you can do it more frequently and more often. We can even have our nontechnical members do analytics, which is something that helped us."
- The superintendent in banking noted: "In our previous environment, this could take us as long as six months. Now, with SAS Viya on Azure, we can complete this in about 48 days. Additionally, the technology is very user friendly. We can

"We're bringing analytics down to the end user. They don't need to understand what happens behind the scenes. The system is doing all the hard work and making it actionable."
Business strategist, IT professional services

teach other business units in as fast as three months to learn how to use the tool."

- The CTO in IT professional services explained: "With SAS Viya, we can be quicker to market with the analytics that we can do, which means our clients recognize ROI faster. We can do things 50% faster compared to our previous environment."

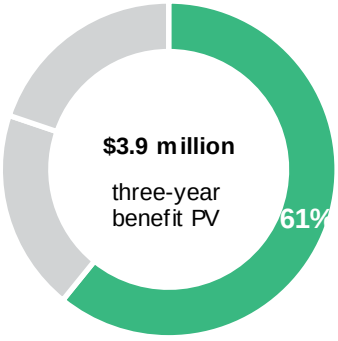
Modeling and assumptions. For the composite organization, Forrester assumes that:

- There are 90 business analysts (90% of the analytics team), which grows at 20% per year.
- The fully burdened annual salary per business analyst is $110,000.[3]
- SAS Viya on Azure impacts 50% of the work of each business analyst.
- The time savings introduced by SAS Viya on Azure is 50% in Year 1, 65% in Year 2, and 80% in Year 3. The gradual increase is mainly influenced by the business analysts getting used to platform and continuous integration with the larger analytics environment.
- Forrester best practice assumes a 50% productivity recapture. The assumption being not 100% of the time savings is reintroduced as productivity.

Risks. Benefits from increased productivity for business analysts from faster analytics process may vary, and specific considerations include:

- The roles and average annual salary of business users of SAS Viya on Azure, which can be influenced by use case, industry, and geography.
- The exact analytics use cases, which can also determine the number of business analysts or users that will be involved and the percentage of their work that is impacted by SAS Viya on Azure.
- The previous environment, which can affect the migration timeline. Migration timelines impact the percentage of SAS Viya on Azure within the overall analytics infrastructure.
- Inflation, which can affect annual salary growth rates.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of $3.9 million.



Increased Productivity For Business Analysts From Faster Analytics Process					
Ref.	**Metric**	**Source**	**Year 1**	**Year 2**	**Year 3**
A1	Number of business analysts involved	Composite	90	108	130
A2	Fully burdened annual salary per business analysts	Assumption	$110,000	$110,000	$110,000
A3	Percentage of work impacted by SAS Viya on Azure	Assumption	50%	50%	50%
A4	Time savings in analytics process for each business analysts with SAS Viya on Azure	Interview	50%	65%	80%
A5	Productivity recapture	Assumption	50%	50%	50%
A6	Percentage of SAS Viya on Azure within overall analytics infrastructure	Composite	50%	100%	100%
At	Increased productivity for business analysts from faster analytics process	A1*A2*A3*A4*A5*A6	$618,750	$1,930,500	$2,860,000
	Risk adjustment	↓10%			
Atr	Increased productivity for business analysts from faster analytics process (risk-adjusted)		$556,875	$1,737,450	$2,574,000
	Three-year total: $4,868,325			**Three-year present value: $3,876,043**	

INCREASED PRODUCTIVITY FOR EMPLOYEES SUPPORTING MODEL BUILDING AND MANAGEMENT

Evidence and data. Interviewees also shared that using SAS Viya on Azure allowed their various employees who were involved in data, analytics, and model development and deployment to realize time savings that could be repurposed for extra productivity. Employees that were involved with data access, data prep, and data quality experienced time savings from the visual interface, as well as the prebuilt templates and automated steps in SAS Viya on Azure. Employees involved in analytics, which can include statistics, artificial intelligence (AI), machine learning (ML), text analytics, and data visualization benefitted from the enterprise scalability of SAS, the visual modeling interface, AutoML pipelines, automatically generated interactive analytics and visualizations, and others. Finally, the data science and IT staff could easily track who developed models, what algorithm was used, the data sets used, the model metadata, and performance in production, all in SAS Viya on Azure.

Interviewees shared that for the model building process, creating model catalogs, and reusing model templates saved them hours that would have been spent creating models from scratch. SAS Viya on Azure could also easily connect and integrate with various data sources and open source code. Additionally, updating models with newly collected data and information was also easier with SAS Viya on Azure. Automation and model monitoring via dashboards meant organizations could greatly reduce the need to deploy an employee to manually make the changes to models to prevent model decays.

- The head of analytics in banking shared: “We build more than 100 models every year [because we use the automation to relieve some of the manual model building through templates]. If we

had to make models from scratch, we would need double the effort to create the same number of models per year."

- The analytics manager in manufacturing noted: "Testing models with linear regression model used to take 5 to 10 minutes per model. We have thousands of models in production per year. Now, we can do it in 15 seconds. The macro takes the effort to getting data, coalescing, merging, and writing data down from one day to a couple seconds."

"For model reviews, we used to need two to three people spending two to three weeks per month checking and updating models. Now, we can practically run everything without any involvement from a team member."
Head of analytics, banking

- The senior manager of payments in banking said: "Updating models went from two weeks down to a day, as we don't have to shut down the entire system to fix a model. We can target the problem directly."

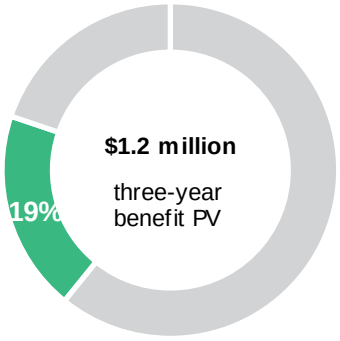
Modeling and assumptions. For the composite organization, Forrester assumes that:

- Employees involved are the data scientists and data engineers (i.e., employees building and managing the models that are used to analyze the inputted data).
- There are 10 data scientists. The number of data employees grows at 20% per year.
- The fully-burdened annual salary per data scientist and data engineer is $200,000.[4]
- SAS Viya on Azure impacts 80% of the work of each data scientists.
- The time savings introduced by SAS Viya on Azure is assumed to be 50% in Year 1, 65% in Year 2, and 80% in Year 3. The gradual increase is mainly influenced by the machine learning feature in SAS Viya on Azure gradually gaining deeper understanding into the inputted data and the model updates.
- Forrester best practice assumes a 50% productivity recapture. The assumption being not 100% of the time savings is reintroduced as productivity.

Risks. Benefits from increased productivity for employees supporting model building and management may vary, and specific considerations include:

- The roles and average annual salary of data scientists, which can be influenced by use case, industry, and geography.
- Organizations' unique analytics use case, which impacts the number of data scientists that are involved and the percentage of their work that is impacted by SAS Viya on Azure. The use case can also determine the connections and integrations with data sources, which can impact the exact time savings realized.
- The previous environment can impact the migration timeline, which impacts the percentage of SAS Viya on Azure within the overall analytics infrastructure.
- Inflation can affect annual salary growth rates.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of $1.2 million.



Increased Productivity For Employees Supporting Model Building And Management					
Ref.	**Metric**	**Source**	**Year 1**	**Year 2**	**Year 3**
B1	Number of data scientists and data engineers supporting model building and management	Composite	10	12	14
B2	Fully burdened annual salary per employee	Assumption	$200,000	$200,000	$200,000
B3	Percentage of work impacted by SAS Viya on Azure	Assumption	80%	80%	80%
B4	Time savings in model building and model management with SAS Viya on Azure	Interview	50%	65%	80%
B5	Productivity recapture	Assumption	50%	50%	50%
B6	Percentage of SAS Viya on Azure within overall analytics infrastructure	A6	50%	100%	100%
Bt	Increased productivity for employees supporting model building and management	B1*B2*B3*B4*B5*B6	$200,000	$624,000	$896,000
	Risk adjustment	↓10%			
Btr	Increased productivity for employees supporting model building and management (risk-adjusted)		$180,000	$561,600	$806,400
	Three-year total: $1,548,000			**Three-year present value: $1,233,629**	

INFRASTRUCTURE COST SAVINGS FROM RETIRING ON-PREMISES ENVIRONMENT

Evidence and data. Interviewees retired their on-premises analytics infrastructure with physical servers and data centers by migrating to SAS Viya on Azure, which is hosted as cloud technology. The savings from no longer having to install and maintain an on-premises infrastructure was significant.

- The superintendent in banking shared, “Our annual cost for the previous environment was about $4 million per year, consisting of a mainframe in the data center.”
- The CTO in IT professional services noted, “Setting up the old environment cost $1,700 per month.”
- The head of analytics in banking added: “Our whole infrastructure prior to SAS Viya on Azure

was developed on on-premises servers. We had a single server machine. We could retire them now that we are on the cloud."

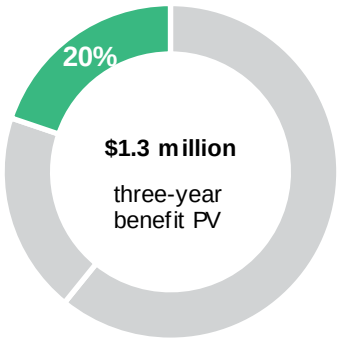
Modeling and assumptions. For the composite organization, Forrester assumes that:

- The capital expenditure of the previous on-premises environment is $600,000 per year.
- The operating expenditure of the previous on-premises environment is 15% of the capital expenditure.
- The migration to SAS Viya on Azure is set where 50% of legacy hardware is retired in Year 1, and 100% in Years 2 and 3.

Risks. Benefits from infrastructure cost savings from retiring on-premises environment may vary, and specific considerations include:

- The complexity of the previous environment, which can impact the annual capital expenditure and operating expenditure.
- The complexity of the previous environment, which can also impact how fast the retirement and decommissioning of legacy technologies can be done.
- The use case and mission-criticality of the analytics environment, which can also impact how fast the migration from on-premises to cloud happens.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of $1.3 million.



Infrastructure Cost Savings From Retiring On-Premises Environment

Ref.	Metric	Source	Year 1	Year 2	Year 3
C1	Capital expenditure of on-premises environment	Composite	$600,000	$600,000	$600,000
C2	Operating expenditure of on-premises environment	Assumption	$90,000	$90,000	$90,000
C3	Legacy hardware cost reduction	Interview	50%	100%	100%
Ct	Infrastructure cost savings from retiring on-premises environment	(C1+C2)*C3	$345,000	$690,000	$690,000
	Risk adjustment	↓10%			
Ctr	Infrastructure cost savings from retiring on-premises environment (risk-adjusted)		$310,500	$621,000	$621,000
	Three-year total: $1,552,500			**Three-year present value: $1,262,062**	

UNQUANTIFIED BENEFITS

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

- **Business growth and expansion opportunities from better analytics.** Interviewees noted the overall improvement in their organizations' analytics process from a time-saving perspective as well as the overall quality of the insights combined with faster, improved decision-making contributes to topline growth and new opportunities that the organization could explore. The business strategist in IT professional services shared: "The more efficient operation and cost savings in operating cost enabled by SAS Viya on Azure allowed us to explore offerings in the Small Medium Business (SMB) customer segment."
- **Flexibility and scalability of the analytics environment.** Interviewees noted the ease of installing SAS Viya on Azure and expanding its use case to other business units as needed gave them a level of flexibility and scalability to their analytics environment. They believe this to be a differentiator to their competitors as they are able to uncover new insights faster. The head of analytics in banking noted: "If we lose several months of waiting for the machines to be there in order to establish the distributed architecture, we would have lost the market opportunity, and the corresponding revenue that would have resulted from the utilization of this infrastructure."

"Through analytics from SAS Viya on Azure, we were able to increase credit limits in our applications and reduce default rates by as much as 40%. We would not get the insights needed to make certain decisions without SAS Viya on Azure."
Senior manager of payments, banking

"The overall availability and reliability of SAS Viya on Azure is the thing that opens up the possibility of all the other things we are trying to explore. As a 24/7 company, even a 5-minute blip will add a lot of cost."
Analytics engineer, manufacturing

- **Real-time impact.** Interviewees shared that for certain use case, the benefits of being able to make an informed decision immediately is crucial. The quality product specialist in manufacturing noted: "Using SAS Viya on Azure allowed us to identify which warranty request truly needs to be paid back. This allowed us to save as much as $3.2 million per year in potentially fraudulent warranty requests."

  The CIO in the public sector said: "In terms of predicting flooding events, the difference between knowing about something 5, 10, 30 minutes after it happened versus real-time is critical. This could be the difference in the ability to potentially save lives of someone driving down a flooding street."

BENEFITS FROM THE INTEGRATION OF SAS AND MICROSOFT

Interviewees also shared benefitting from SAS Viya on Azure being a collaboration between SAS and Microsoft. This includes benefitting from the feature integrations, such as SAS Model Manager and Azure Machine Learning, SAS Intelligent Decisioning and Power Apps & Power Automate, and the ability to score models in-database in Azure Synapse Analytics.

- **Benefits from the features.** Interviewees shared that the combination and integration between SAS Viya and Microsoft Azure allowed them to do much more than what they could do separately. The CTO in IT professional services said: "We have been able to do a lot of productivity enhancements from this integration. We're doing application scoring. We're in the process of doing data mining to determine additional opportunities with our existing clients. The features that resulted from this integration allows us to uncover new opportunities that were not possible before."

  The head of analytics in banking added: "The visualization features of SAS Viya on Azure makes it very easy to communicate with other units and decision makers on any analytical insights we are able to generate. We are now much more efficient in presenting data."

"We are going through a digital transformation, and it is good to know that we have SAS and Microsoft as partners to help us go through the process."
Superintendent, banking

"The tools and infrastructure between SAS and Microsoft works well together, in addition to a very good support behind it."
Quality product specialist, manufacturing

- **Benefits from partnering with SAS and Microsoft.** Interviewees noted having partners such as SAS and Microsoft to help them go through a digital and business transformation was valuable. The head of analytics in banking noted: "The benefit from having the two brands work together is they can solve any issue that we might encounter."

FLEXIBILITY

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

- **Better quality results and more engaged stakeholders.** Interviewees shared that their investment in SAS Viya on Azure is an investment in making their environment more data driven. The analytics manager in manufacturing noted: "All the new options available in Viya attracts people to put more time to create more robust reports. It's very interactive to drill down and across to understand what is going on there."

The senior manager of payments in banking added: "Prior to SAS Viya on Azure, we could only make credit limit decisions based on whether or not the person makes the payment every month. Now, we can analyze a wider range of payment behavior. We have machine learning models that can evaluate more variables to understand our customers."

- **Analytical insights with growing significance to the organization.** Interviewees noted that the continuous improvement to their analytical process from an operational efficiency perspective, as well as the better quality insights that can be uncovered will gradually allow the organization to make more informed, data driven decisions. The analytics engineer in manufacturing noted: "As we continue to show the dependability of SAS Viya on Azure, people will come to us with harder and harder problems that they can't solve.

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

"In the long run, [SAS Viya on Azure] gives us the ability to have models that better reflect our process and our organization."
Analytics manager, manufacturing

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	SAS Viya on Azure costs	$0	$309,750	$309,750	$309,750	$929,250	$770,302
Etr	Internal costs related to implementation	$822,250	$0	$0	$0	$822,250	$822,250
Ftr	Internal costs related to ongoing support and management	$0	$170,500	$204,600	$238,700	$613,800	$503,430
	Total costs (risk-adjusted)	$822,250	$480,250	$514,350	$548,450	$2,365,300	$2,095,982

SAS VIYA ON AZURE COSTS

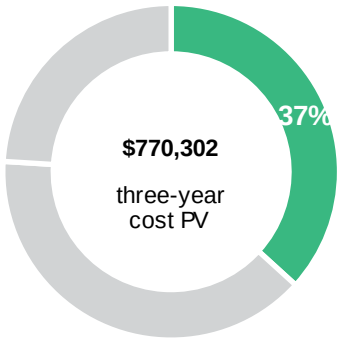
Evidence and data. Pricing for SAS Viya on Azure was flexible and allowed the interviewees' organizations to configure granular levels of compute, storage, and related services.

Modeling and assumptions. For the purpose of this study, Forrester assumes that the composite organization pays $295,000 per year for their access to SAS Viya on Azure. This cost is inclusive of the SAS Viya licensing cost and the Azure consumption.

Risks. The SAS Viya on Azure costs may vary depending on the following factors:

- The analytics use cases for which SAS Viya on Azure is used for.
- The number of users that require access to SAS Viya on Azure.

Results. To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year, risk-adjusted total PV of $770,000.



SAS Viya On Azure Costs						
Ref.	**Metric**	**Source**	**Initial**	**Year 1**	**Year 2**	**Year 3**
D1	SAS Viya on Azure costs	Microsoft/SAS		$295,000	$295,000	$295,000
Dt	SAS Viya on Azure costs	D1	$0	$295,000	$295,000	$295,000
	Risk adjustment	↑5%				
Dtr	SAS Viya on Azure costs (risk-adjusted)		0	$309,750	$309,750	$309,750
	Three-year total: $929,250			**Three-year present value: $770,302**		

INTERNAL COSTS RELATED TO IMPLEMENTATION

Evidence and data. Implementation included activities, such as cloud environment setup, data migration, and user training. Interviewees noted that the time for migration was highly dependent on the previous environment. Some interviewees completed its migration and shift to the cloud in a couple weeks, while others took closer to a year. Some interviewees involved an external implementation partner, while others completed the migration utilizing their external resources.

- The analytics manager in manufacturing said: "It took us 10 months to be production ready. We also had both our prior environment and SAS Viya on Azure run in parallel for a couple weeks. Five people were involved in our setup and migration."
- The CTO in IT professional services noted: "From a man hour perspective, implementation took 2 to 4 hours to get the environment up and running. We had the old and new environment side by side for about two weeks."
- The superintendent in banking said: "We are still in the process of migration, which in total should take about six months. We hired a specific person to manage the environment for us. We also hired an external consulting partner to help us with implementation."
- The head of analytics in banking noted: "Building the models on SAS took us about 1.5 months. Creating the production environment and migrating the model took another 1.5 months. We are now in the process of migrating some old models from our previous on-premises servers into the cloud infrastructure."
- The quality product specialist in manufacturing said: "We needed three months to set up SAS Viya on Azure. Training our people to work with the SAS code took another two months. In terms of involvement, we had a couple people from IT, and we also hired an implementation partner."

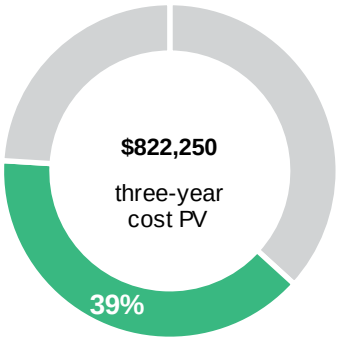
Modeling and assumptions. For the composite organization, Forrester assumes that:

- The time for setup and migration took one year, which includes setup, development, and testing.
- The composite involved five people for setup and migration, dedicating 50% of their time.
- The average fully burdened annual salary of the internal staff involved is $155,000, assuming an equal mix of business analysts and data-related employees that are involved.[5]
- The composite hired an external implementation partner to assist with migration, with the assumed cost of $160,000.
- The composite also spent one month to train its 100 people analytics team, who dedicated 10% of their time for training.

Risks. The internal cost related to implementation may vary depending on the following factors:

- The exact use case for SAS Viya on Azure and the overall analytics environment will impact the number and roles of people involved.
- The industry and geography of the organization can impact the annual salary and cost for implementation partner.
- Inflation can affect annual salary growth rates.

Results. To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year, risk-adjusted total PV of $822,000.



Internal Costs Related To Implementation

Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
E1	Time for setup and migration (years)	Composite	1			
E2	Number of internal staff involved in setup and migration	Composite	5			
E3	Percentage of time dedicated for setup and migration	Interview	50%			
E4	Average fully burdened annual salary of internal staff involved in setup and migration	Assumption	$155,000			
E5	Subtotal: Total cost for setup and migration	E1*E2*E3*E4	$387,500			
E6	External implementation partner to assist with migration	Assumption - 80% of licensing cost	$236,000			
E7	Time for training	Composite	0.08			
E8	Number of users trained	Composite	100			
E9	Percentage of time dedicated for implementation	Interview	10%			
E10	Subtotal: Total cost for training	E4*E7*E8*E9	$124,000			
Et	Internal costs related to implementation	E5+E6+E10	$747,500	$0	$0	$0
	Risk adjustment	↑10%				
Etr	Internal costs related to implementation (risk-adjusted)		$822,250	$0	$0	$0
	Three-year total: $822,250			**Three-year present value: $822,250**		

INTERNAL COSTS RELATED TO ONGOING SUPPORT AND MANAGEMENT

Evidence and data. Interviewees noted that ongoing support and management typically included internal employees tasked with the SAS Viya on Azure usage within the organization. Depending on the use case and the analytics environment, this meant different things to different organizations.

- The analytics manager in manufacturing said: "We do not have a dedicated IT resource for SAS. We have a SAS partner that we contract to be our architect, and we have an internal admin, working part-time on this solution. Managing Viya is pretty low impact. We plan to do quarterly and semi-annual activities. We keep our two admins busy because we continue to add new packages. Additionally, we do a weekly meeting with the SAS team to check through action items, as well as the performance metrics."
- The CTO in IT professional services said: "On a quarterly basis, we take a couple hours to do a data extract, and then transfer it to the SAS environment."
- The superintendent in banking said: "We engage with SAS on a monthly basis to understand best practices and help teach other people about SAS Viya on Azure."
- The quality product specialist in manufacturing said: "We have three to five people doing the analytics internally. We have an additional three people from SAS. We have weekly meetings with SAS to check on the tool. Every month, we have two to three people meet with SAS to review the results and needs.

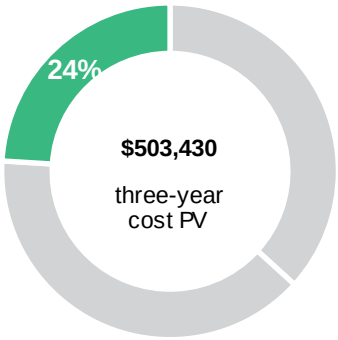
Modeling and assumptions. For the composite organization, Forrester assumes that:

- Ten internal staff are involved in ongoing support and management, dedicating 10% of their time.
- The average fully burdened annual salary of the internal staff involved in ongoing support and management is $155,000.[6]
- As the use case grows, the number of internal staff involved in ongoing support and management also grows by 20% per year.

Risks. The internal cost related to ongoing support and management may vary depending on the following factors:

- The exact use case for SAS Viya on Azure and the overall analytics environment will impact the number and roles of people involved in ongoing support and management.
- The industry and geography of the organization can impact the annual salary of the internal staff involved in ongoing support and management.
- Inflation can affect annual salary growth rates.

Results. To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year, risk-adjusted total PV of $503,000.

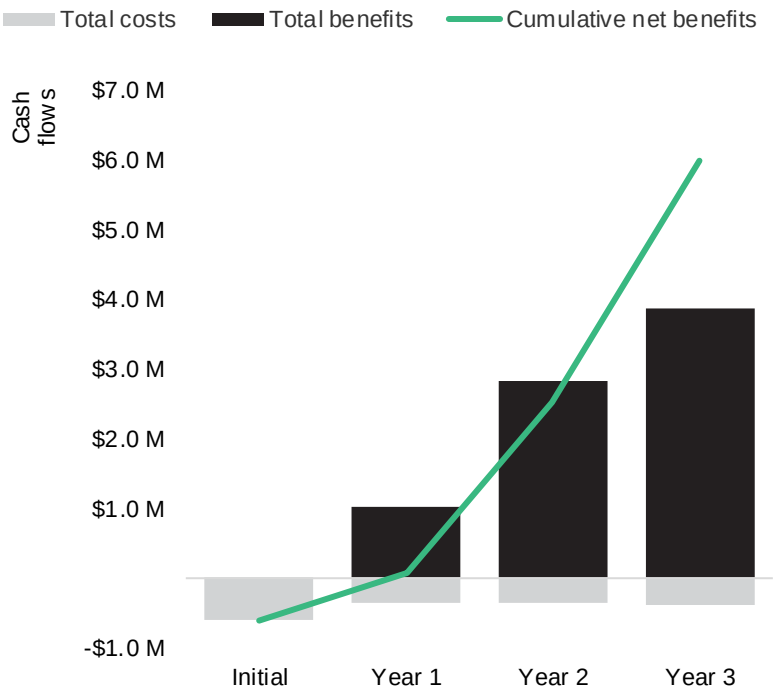


Internal Costs Related To Ongoing Support And Management						
Ref.	**Metric**	**Source**	**Initial**	**Year 1**	**Year 2**	**Year 3**
F1	Number of internal staff involved in ongoing support and management	Composite		10	12	14
F2	Percentage of time dedicated to ongoing support and management	Interview		10%	10%	10%
F3	Average fully burdened annual salary of internal staff involved in ongoing support and management	Assumption		$155,000	$155,000	$155,000
Ft	Internal costs related to ongoing support and management	F1*F2*F3	$0	$155,000	$186,000	$217,000
	Risk adjustment	↑10%				
Ftr	Internal costs related to ongoing support and management (risk-adjusted)		$0	$170,500	$204,600	$238,700
	Three-year total: $613,800			**Three-year present value: $503,430**		

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	($822,250)	($480,250)	($514,350)	($548,450)	($2,365,300)	($2,095,982)
Total benefits	$0	$1,047,375	$2,920,050	$4,001,400	$7,968,825	$6,371,734
Net benefits	($822,250)	$567,125	$2,405,700	$3,452,950	$5,603,525	$4,275,752
ROI						204%
Payback period (months)						14.0

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

[1] Source: “Cloud Powers The Adaptive Enterprise,” Forrester Research, Inc., January 25, 2022.

[2] 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.

[3] Fully burdened salary includes both the direct wages and indirect costs of hiring and employment. Burden rate refers to indirect costs of employment beyond direct compensation, including, but not limited to: hiring costs, training costs, insurance, paid time off, sick leave, expenses, retirement contributions, payroll taxes, and incremental technology and workplace costs for the employee.

[4] Ibid.

[5] Ibid.

[6] Ibid.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