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The Total Economic Impact™ Of Microsoft Azure AI

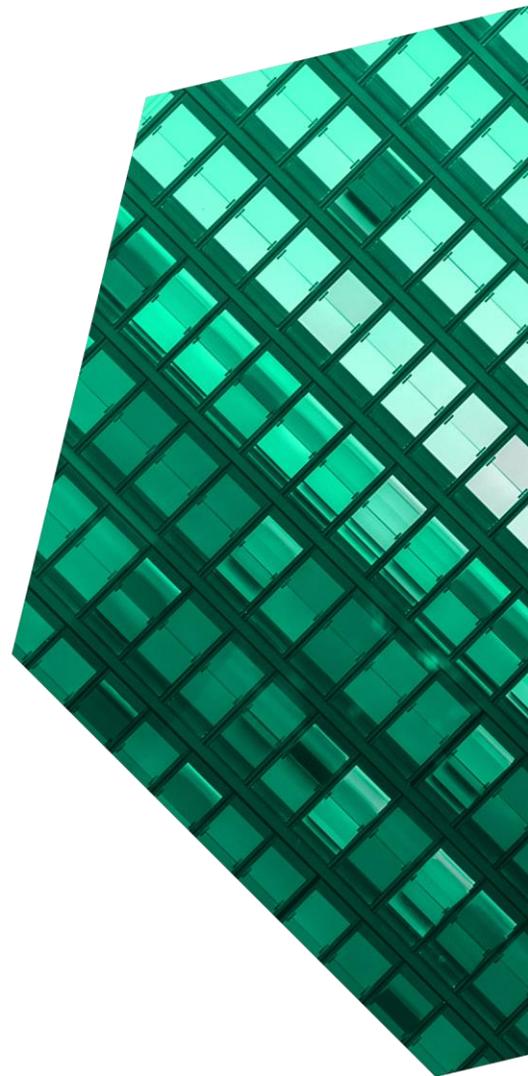
Cost Savings And Business Benefits
Enabled By Azure AI

APRIL 2023

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ABOUT FORRESTER CONSULTING

Forrester provides independent and objective research-based consulting to help leaders deliver key transformation outcomes. Fueled by our customer-obsessed research, Forrester’s seasoned consultants partner with leaders to execute on their priorities using a unique engagement model that tailors to diverse needs and ensures lasting impact. For more information, visit forrester.com/consulting.

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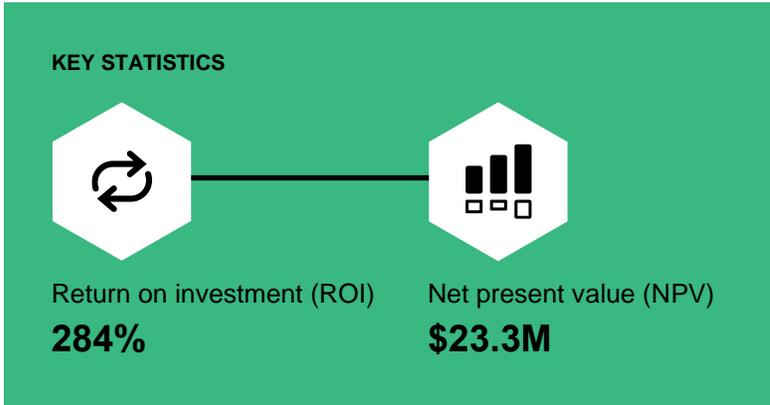
Executive Summary

Artificial intelligence (AI) is critical for enterprises that want to build differentiated experiences and applications. Microsoft Azure AI is a portfolio of AI and machine learning (ML) services that help organizations modernize their workflows, increase effectiveness and efficiency, and make complex decisions and predictions. With Azure AI, organizations can minimize costs, automate workflows, and deliver new or improved services to clients and customers with a short time from investment to value delivery.

Artificial intelligence (AI) has become integral to technology strategies for organizations of all sizes, industries, and maturity levels. According to Forrester's 2022 Data And Analytics Survey, 73% of data and analytics decision-makers are already investing in AI technologies.¹ Forrester predicts that off-the-shelf and custom AI software spend will double between 2021 and 2025, from \$33 billion to \$64 billion.²

Decision-makers are expanding the scope of AI at their organizations to operationalize a growing portfolio of AI solutions across different use cases and to expand its usage beyond data science teams to business, software development, and IT operations. Organizations often start their broader AI adoption journey with machine learning (ML) to make digitized data actionable, as well as unify and customize AI services investments. Modern AI platforms are accelerating this expansion by supporting repeatable and scalable AI development processes.³ This also helps organizations that are just starting out with and/or are establishing AI/ML teams to develop a strategic AI approach that includes engineering, operations, and business team collaboration. AI services can help these organizations understand how and where they can quickly realize value, and the possibilities of what they can achieve on their AI journey.

[Microsoft Azure AI](#) is a collection of AI services and machine learning solutions that help developers, data



scientists and organizations build AI into their applications. Azure AI Services include Vision (e.g., optical character recognition, spatial analysis), Speech (e.g., text-to-speech, speech-to-text, Custom Neural Voice), Language (e.g., translator), Decision, and OpenAI — all of which are available through REST APIs and library software development kits (SDKs). Azure AI also offers services designed for specific business scenarios including Form Recognizer or Intelligent Document Processing, Cognitive Search, and Bot Service. Finally, Azure Machine Learning is a cloud platform supporting the ML project lifecycle, helping data scientists and developers to build, deploy, and manage ML models securely and responsibly at scale.

Microsoft commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI)

enterprises may realize by deploying Azure AI.⁴ The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of Azure AI on their organizations.

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed six decision-makers at five customer organizations with experience using Azure AI. For the purposes of this study, Forrester aggregated the experiences of the interviewed customers and combined the results into a single composite organization.

Prior to using Azure AI, some of the interviewees' organizations were familiar with AI/ML development and had previously tested and deployed their own models in-house. Others had no experience with AI or ML technology and relied on human-led physics or economic models, while some purchased and leveraged basic AI or ML tools. The organizations found that the tools they were using did not deliver on key functionalities, and custom models they built were difficult or labor intensive to scale. They looked externally for a partner to help them utilize and scale AI and ML solutions to help them solve these challenges and propel them ahead of their competitors with increased efficiency and innovation.

After the investment in Azure AI, the customer organizations increased the quality and scalability of their AI and ML models, and used ML predictive models to optimize costs across the business. Error rates in model outputs fell compared to in-house or open-source models, saving employees time and improving their customer experience (CX). They utilized Azure AI's Cognitive Services and Applied AI services to apply AI to customer-facing services or revenue streams, grow their businesses and generate additional revenue through increased service delivery, improve customer acquisition and retention, and develop and launch new products. At the same time, productivity improved for data scientists and AI/ML engineers as well as employees whose work was partially or fully automated by AI solutions.

“We believe that data will transform our business and the best way to exploit data at scale in the mid- to long-term is through AI. It is a triangle; knowledge, data, and AI.”

Partner, professional services

KEY FINDINGS

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

- **A 150% increase in work output.** Azure AI spurs business growth for the composite organization in a variety of ways. The composite uses Azure AI to automate and scale processes to increase business volume, improve its customer acquisition and retention, and develop and sell new services to its clients. Over three years, Azure AI delivers more than \$12.5 million in profit.
- **Improved spending optimization reducing costs by 7%.** AI and ML analyses and models enables the composite organization to make more informed decisions and identify opportunities for optimization. Predictive models can be applied using Azure Machine Learning to optimize 1 to 2% of its overall operating costs, thus reducing its expenditure by 7% in Year 3. This cost savings is worth \$16 million over three years.
- **Process automation reducing manual work by 80%.** Azure AI reallocates employee time to higher-value work by streamlining or replacing manual work entirely, thus improving productivity. With Azure AI, the composite automates 80% of the work of a 16-person team and fully saves the

labor cost equivalent of six full-time equivalent (FTE) employees each year. Over three years, these labor savings amount to more than \$1.6 million for the organization.

- Increased operational efficiency.** Azure AI provides AI tools, methods, and frameworks to develop, train, and validate ML models in a more efficient and scalable way. With Azure AI, the composite modernizes its template and ML model development, training, validation, deployment, and fine-tuning, thus accelerating production. This improved productivity by 25% for the eight employees working on ML activities prior to Azure AI, on top of helping them deploy more AI/ML models and applications. Furthermore, the organization reduces its document processing error rate by 60% by replacing an old open-source optical character recognition (OCR) tool with Azure AI. Over three years, these savings amount to more than \$1 million.
- Reduced legacy technology.** The composite organization decommissions some legacy on-premises and third-party point solutions in favor of Microsoft Azure’s pay-as-you-go cloud licensing model. In making this investment, the organization realizes savings of \$57,000 from reduced legacy licensing, maintenance, administration, and support costs.

Unquantified benefits. Benefits that provide value for the composite organization but are not quantified for this study include:

- Optimized budgeting and reallocated spending leading to greater returns.** Azure AI enables decision-makers to create predictive demand and revenue models to free up or reallocate spending, encouraging the highest possible capital gains on their revenue.
- Faster and higher quality decision-making.** Predictions from Azure AI influences decisions at the executive board level, and helps decision-makers deliver data-driven answers.
- Greater innovation and cross-team alignment.** Early demonstrations of value with Azure AI proves the technology’s credibility and spurs collaboration between technical and business teams to invent creative ways to unlock additional value with data and AI.
- Improved employee safety.** Azure’s AI-enabled remote equipment operations and monitoring drastically mitigate employee safety risks, by detecting and preventing hazardous behavior.
- Enhanced model compliance and governance, and insurance of responsible AI/ML practices.** Azure AI can help organizations quantify model fairness, robustness, and security, and ensure that their models are properly governed and adhere to ethical principles.
- Reduced greenhouse gas emissions.** Azure AI reduces organization’s waste and greenhouse gas emissions by optimizing materials or energy usage.
- Improved employee experience (EX).** By releasing employees from routine, manual tasks, they can reallocate time on more engaging work.
- Reduced risk.** Azure AI helps organizations identify and manage risk, and reduces the risk of

“Our investment is like 0.1% of our benefits. Our cost is like 0.1% of the benefits we generate.”

Program manager, retail

compliance violations, penalties, or fines. Predictive analytics use cases help organizations anticipate and prevent equipment failure or risky customer behavior.

Costs. Risk-adjusted PV costs include:

- **Azure AI consumption and services costs totaling \$1.6 million.** Azure AI is priced according to the type of capability or use case and based on usage, while Azure Machine Learning pricing is based on the underlying compute resources used for training or inferencing. Pricing additionally varies by region and depending on specific organizations' characteristics and needs. By Year 3, the composite organization pays \$350,000 for its use of Azure Cognitive Services and Applied AI Services, \$250,000 for Azure Machine Learning, and \$30,000 for Microsoft implementation and support services.
- **Implementation, application building, and training costs totaling \$1.7 million.** The composite incurs upfront internal labor costs from time spent on implementation and change management, as well as labor costs associated with the time internal employees spend receiving Azure AI training. Initial work on data and technological infrastructure setup, application building, model training, and refinement takes nine months and makes up 80% of the work conducted by a team of six engineers. Four engineers work on the AI applications involved in new product development through the first third of Year 2. The organization's AI/ML engineers and data scientists spend a total of 80 hours each receiving training and learning about Azure AI. As a managed account with Microsoft, the composite organization receives free structured training or guidance from the Microsoft team.
- **Management and quality assurance labor costs.** Ongoing administration and management of Azure AI mainly consists of solution monitoring

and bug fixes, retesting and optimization, maintaining data storage and integrations, and internal auditing of and reporting on models, which totals to \$4.9 million. In the composite organization, 15 AI/ML engineers support Azure AI during Year 1, which increases to 30 in Year 2, and 40 in Year 3. The percentage of the engineer's time spent managing and optimizing the modeled use cases decreases over time, from 50% in Year 1, to 25% in Year 2, and 15% in Year 3. A QA team of up to five employees provides ongoing oversight of the models to ensure the quality and usability of the outputs.

The customer interviews and financial analysis found that a composite organization experienced benefits of \$31.5 million over three years versus costs of \$8.2 million, adding up to a net present value (NPV) of \$23.3 million and an ROI of 284%.

“Everything needs to go this direction. That’s clear. We’re only at the beginning of the journey.”

Program manager, retail



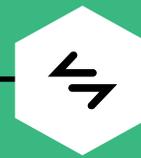
ROI
284%



BENEFITS PV
\$31.5M

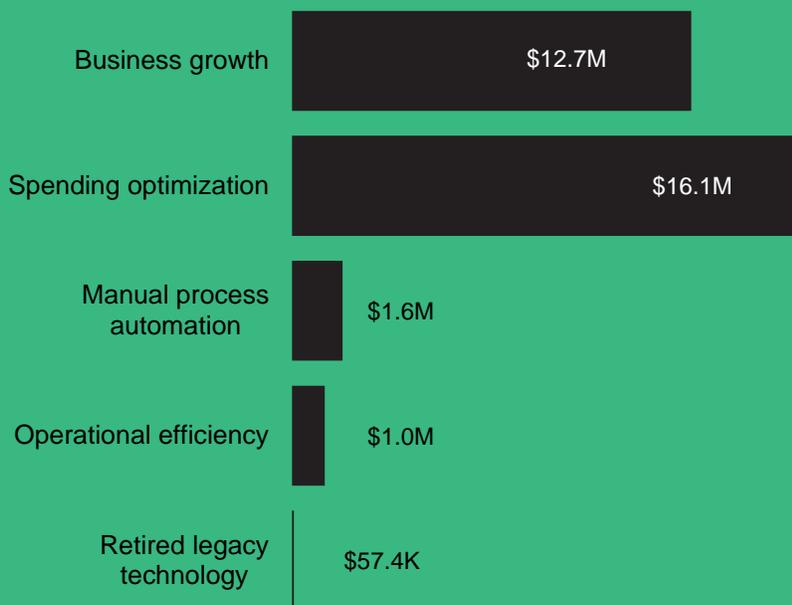


NPV
\$23.3M



PAYBACK
<6 months

Benefits (Three-Year)



**“Now, for a firm like [ours],
[investing in AI] is mandatory. We
cannot imagine our future without
embracing AI.”**

— Partner, professional services

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 Azure AI.

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 Azure AI can have on an organization.

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by Microsoft 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 Azure AI.

Microsoft 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.

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



DUE DILIGENCE

Interviewed Microsoft stakeholders and Forrester analysts to gather data relative to Azure AI.



INTERVIEWS

Interviewed six decision-makers at five organizations using Azure AI to obtain data about costs, benefits, and risks.



COMPOSITE ORGANIZATION

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



FINANCIAL MODEL FRAMEWORK

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



CASE STUDY

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

The Microsoft Azure AI Customer Journey

■ Drivers leading to the Azure AI investment

Interviews				
Role	Industry	Revenue	Relevant Azure AI Usage	Main Use Cases
Principal architect, AI	Energy	\$231 billion	Cognitive Services, Applied AI Services, Azure Machine Learning	Anomaly detection, predictive maintenance, demand forecasting, data verification/document intelligence
Integrated business services, program management	Retail	\$96 billion	Azure Machine Learning	Demand forecasting
Partner	Professional services	\$45 billion	Cognitive Services, Applied AI Services, Azure Machine Learning	Fraud detection/transaction monitoring, document intelligence, optimization
Head of go-to-market (GTM) and digital solution portfolio management	Technology	\$30 billion	Cognitive Services	Anomaly detection, predictive maintenance
Senior vice president, industrial analytics	Technology	\$30 billion	Cognitive Services	Anomaly detection, predictive maintenance
Senior principal, digital	Aviation	\$1 billion	Applied AI Services	Document intelligence/optical character recognition

KEY CHALLENGES

Forrester spoke to representatives at five organizations with experience using Azure AI. Prior to deploying Azure AI, some of the interviewee's organizations had no experience with AI or ML technology and relied on human-led physics or economic models. Others' data science and engineering teams were testing out building and deploying their own models in house. Multiple utilized basic open-source AI or ML models for simple task automation.

In their prior states, the interviewees' organizations struggled with challenges including:

- **Use of manual processes.** Some organizations had various manual, routine processes that required a lot of manpower, that they knew presented an opportunity for automation. These processes included account or transaction monitoring, data verification, equipment inspections, template creation, or data extraction.

“[Our engineering teams] would build very complex physics models to make predictions. Around 2016, a lot of them gravitated towards statistical-based view with machine learning and became self-taught, experimenting. You have business data scientists augmented with digital, but the problem there was MLOps — how do you productionize those custom models?”

Principal AI architect, energy

- **Having existing models that did not deliver key functionalities or were difficult to productionize and scale.** The aviation organization was using an open-source OCR tool, but it lacked functionality for context searching or recognition of non-English languages. The energy organization had custom models that they struggled to productionize without a formal ML operations team and limited technological tools and know-how.
- **A need for efficiency, innovation, and market differentiation.** The retail organization knew that they needed to transform their ways of working to improve the accuracy of their previous models to get ahead of their competitors.

INVESTMENT OBJECTIVES

To solve for these challenges, the interviewees' organizations turned externally to find a partner to help them utilize AI and ML solutions. Some organizations chose Azure AI simply because of an existing established relationship with Microsoft, but most evaluated multiple service providers. In their search, they looked for a solution and provider that:

- Would help them quickly operationalize work with AI and/or ML.
- Provided high quality and accurate pre-trained, task-specific models.
- Offered a low- or no-code interface.
- Integrated with other products or solutions to enable an end-to-end, holistic business solution with one provider.
- Had deep expertise in and experience with their industry or product space.
- Had an innovation mindset and would keep its offerings at the forefront of technology.
- Invested in a partnership model rather than a transactional one, with customer-facing consulting offerings and industry specialists.

“During our testing, Microsoft came up on top in terms of speed and text accuracy across all languages.”

Senior principal, digital, aviation

Once a decision was made, most of the organizations began their Azure AI deployments with a smaller use case that had a clear value proposition or was meant to solve a specific business problem. As they became more familiar with the technology, their use of AI and ML grew within the organizations to span a wide breadth of teams, use cases, and objectives. Multiple organizations utilized Azure Databricks for data preparation, pre-processing, and storage to help manage their analytics and AI workloads.

“When we talk about industrialization, we go with Microsoft.”

Partner, 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 five companies that Forrester interviewed and is used to present the aggregate financial analysis in the next section. The composite organization has the following characteristics:

Description of composite. The global business-to-business (B2B) organization earns \$20 billion in annual revenue, and its operating profit margin is 10%. The organization has a team of eight data analysts and data engineers who explored AI and ML modeling before the investment in Azure AI and utilized a simple open-source OCR tool to convert written or printed text into machine-readable text as part of a service offering for their customers.

Key Assumptions

- **B2B business model**
- **\$20 billion annual revenue**
- **10% profit margin**

“The Microsoft offering was particularly appealing because of the integration with Power BI, Power Apps and even plugins for Excel, where you could connect Azure endpoints that have been built with desktop products at the business you are used to working with.”

Principal AI architect, energy

Deployment characteristics. After an initial planning, model development, and training period, the organization’s ML-focused team grows from eight to 10 people at the start of Year 1. The team deploys Azure Cognitive Services, Azure Applied AI, and Azure Machine Learning in Year 1 to automate manual work, optimize costs, and upgrade their old OCR software. In Year 2, the organization’s AI team continues to expand, reaching 30 people — and they launch a new product of which Azure AI is a fundamental part. By Year 3, the team consists of 40 data scientists and AI and ML engineers, who are continuously working on developing and training additional custom models for value and additional use cases beyond the modeled benefits. They have a QA team of four to five people who oversee processes. The organization has an enterprise account with Microsoft.

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	Business growth	\$3,155,625	\$5,565,375	\$6,923,250	\$15,644,250	\$12,669,774
Btr	Spending optimization	\$2,880,000	\$7,200,000	\$10,080,000	\$20,160,000	\$16,141,848
Ctr	Manual process automation	\$646,380	\$646,380	\$646,380	\$1,939,140	\$1,607,451
Dtr	Operational efficiency	\$382,979	\$436,339	\$436,339	\$1,255,657	\$1,036,602
Etr	Retired legacy technology	\$9,975	\$19,950	\$42,394	\$72,319	\$57,407
	Total benefits (risk-adjusted)	\$7,074,959	\$13,868,044	\$18,128,363	\$39,071,366	\$31,513,082

BUSINESS GROWTH

Evidence and data. Azure AI spurred business growth for the interviewee’s organizations in a variety of ways depending on their use case and products utilized. Customers enjoyed increased revenue through enhanced business volume, improved customer acquisition and retention, and the development of new products and services. Specific examples of customers’ journeys from Azure AI to revenue growth included:

- **Automation improving process scalability and increasing work volume.** Process automation powered by Azure AI significantly improved operational efficiency and increased the organizations’ capacity to scale up the volume of their work, or output, in the section of the business that applied AI. This automation improved the efficiency and quality of service delivery to clients or customers and helped organizations support more customers or produce more of a product, facilitating additional sales and increasing revenue.

Azure OCR helped the aviation organization grow their document processing, indexing, and

classification services, allowing them to serve additional clients. The senior principal of digital at an aviation firm said, “[Azure OCR] allows us to immediately increase our scale without incurring additional resources on our end to scale.” They noted that they processed six to eight times as many documents with Azure AI as they could with their old open source OCR software. Before their investment with Azure AI, they could only support one or two major clients per year, but that capacity increased to six within a few years.

“The real value is that it allows us to scale the way we do an audit, the way we do tax filing or the way we interpret data for our clients or monitor transactions, the multiplier of scale is through AI in most of the cases.”

Partner, professional services

The energy organization used Azure AI for remote asset operations and monitoring at a scale that they were unable to reach without AI technology. The principal AI architect explained: “There isn’t enough human SME capacity to do [asset monitoring] in any other way. They’ve tried doing it by eyeballing real-time analytics, and they physically can’t scale to look at all of that. ... We’re talking 6 million custom models to cover all the equipment in the company. With Cognitive Services, you can roll that out very quickly across one base implementation where you don’t have to custom craft all these models.”

A partner at the professional services organization described using Azure AI to audit financial transactions, interpret data, and run document intelligence for clients. They noted that their tax solution with Azure AI alone drove millions of Euros of business for their organization, and using Azure AI was essential for them to provide the services at the scale they needed.

- **Improved customer acquisition and retention.** Using Azure AI for customer-facing use cases improved the quality of their services, resulting in more clients and customers being acquired and retained.

The partner at a professional services organization said Azure ML reduced their rate of errors in their transaction monitoring. This helped their clients avoid large fines or false accusations, and improved their customer satisfaction.

“You can scale something very quickly and you don’t need an army of PhD data scientists.”

Principal AI architect, energy

The technology organization worked largely with manufacturing companies, most of whom worked with Microsoft as a partner or vendor. Offering a solution built on Azure helped the technology organization gain market credibility and made their product or service offerings more appealing for customers, their existing technology stack would integrate well with the offerings.

The aviation organization improved their customer acquisition with a faster onboarding process and customer retention by reducing errors, and enabling faster delivery of their document processing services. Azure AI enabled more effective set up of their customer document templates and data pipelines, reducing their customer onboarding timeline from six to 12 months to one to three months. Their prior process offered less visibility into their pipeline and less consistency in their work, and was unable to guarantee customers would receive their processed documents within reasonable timelines. Azure AI enabled them to offer time estimates of 20 minutes to one hour, from their previous estimates of three to four hours. The senior principal of digital described: “Before, when the customer asks us when it arrives, it can be one hour, or four hours. With the new process, customers are really happy because they can immediately see the impact.”

- **The development and launch of new products and services.** Azure AI enabled interviewee’s organizations to develop new products and services, resulting in new revenue streams.

Decrease in customer support tickets:

40%



The technology company developed two new products with Azure AI: One was an industrial analytics and AI suite, where they help customers develop their own AI applications with Azure, and the other was an asset performance management (APM) solution that they sell directly to customers. The APM solution utilizes AI applications for anomaly detection, predictive maintenance, and risk analysis. The organization’s technology head of digital portfolio management said: “We help our customers build their applications using the AI/ML capabilities and contextualized data and our domain knowledge. We bring all that together to provide solutions to our customers.”

The professional services organization then developed and licensed a documenting intelligence and voice intelligence platform solution built on Azure AI, which they sell as a managed services technology.

“With Azure OCR, and the scalability of OCR and the accuracy and the speed that they have, we brought [our customer onboarding timeline] down from six to 12 months to one to three months.”

Senior principal, digital, aviation

technology, Azure AI makes up the entire technology piece.

- The organization develops a new product based on Azure AI for business customers. The product is launched midway through Year 2 — it generates \$24 million in revenue in Year 2, and \$48 million in Year 3.
- Fifteen percent of the new product revenue can be directly attributed to Azure AI. This is a lower attribution percentage because the technology itself played a smaller role in the total design and sales success of the new product.
- The composite has an operating profit margin of 10%.

Risks. The expected financial impact is subject to risks and variation based on factors including the organization’s:

- Azure AI scope of deployment and use cases.
- Type of revenue source, its annual number of sales and revenue per sale, and operating profit margin.
- Level of internal investment in model development, training, and fine-tuning.

Results. To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a

Increase in volume of work:

150%



Modeling and assumptions. Forrester modeled the impact for the composite organization assuming:

- The composite utilizes AI to increase work volume for a team with a 150 million revenue stream that serves business customers.
- With Azure AI, the team’s total volume of work output increases by 75% in Year 1, 125% in Year 2, and 150% in Year 3, allowing them to serve more customers and generate added revenue.
- Thirty-three percent of the increased work output can be directly attributed to Azure AI. Attributing one-third of the outcome to people, process, and

three-year, risk-adjusted total PV (discounted at 10%) of \$12.7 million.

Business Growth					
Ref.	Metric	Source	Year 1	Year 2	Year 3
A1	Size of revenue stream affected by Azure AI before investment	Composite	\$150,000,000	\$150,000,000	\$150,000,000
A2	Increased work output with Azure AI	Interviews	75%	125%	150%
A3	Azure AI attribution	Interviews	33%	33%	33%
A4	Subtotal: Additional revenue from increased volume with Azure AI	A1*A2*A3	\$37,125,000	\$61,875,000	\$74,250,000
A5	Size of revenue stream from new product developed with Azure AI	Composite	\$0	\$24,000,000	\$48,000,000
A6	Azure AI attribution	Interviews	15%	15%	15%
A7	Subtotal: Revenue from new product	A5*A6	\$0	\$3,600,000	\$7,200,000
A8	Operating profit margin	Composite	10%	10%	10%
At	Business growth	(A4+A7)*A8	\$3,712,500	\$6,547,500	\$8,145,000
	Risk adjustment	↓15%			
Atr	Business growth (risk-adjusted)		\$3,155,625	\$5,565,375	\$6,923,250
Three-year total: \$15,644,250			Three-year present value: \$12,669,774		

SPENDING OPTIMIZATION

Evidence and data. AI and ML analyses and predictive models can identify patterns or insights that humans cannot — enabling businesses to make more informed decisions and identify new growth or optimization opportunities. Azure AI customers reported a variety of cost optimization use cases, from minimized energy consumption to optimized inventory expenditure and storage. Azure ML increase model deployment, accuracy, and quality for organizations that were already using internal ML modeling, allowing them to further minimize their expenses. Improved monitoring and standardized production also ensured models stayed accurate or increased accuracy over time. Customers described realizing cost savings with Azure AI:

- **Reduced energy consumption.** The principal AI architect at the energy organization described using a model to predict and optimize the best shipping routes, timing, and speed of large shipping vessels to use the smallest amount of bunker fuel, thus generating large cost savings. They explained: “Those vessels generally cost about a quarter of a million dollars a day, that can go up to \$1.5 million a day depending on how

tight the market is. A lot of that cost can be optimized by optimizing whether it’s a port cost or a bunker cost. They’re pretty big numbers.”

- **Reduced maintenance costs.** The technology and energy organizations used Azure AI for remote asset monitoring and predictive maintenance to minimize costly breakages and downtime of large equipment. This was possible by being able to anticipate and fix problems before equipment failed. Preventing equipment failures greatly reduced the equipment’s lifetime cost of maintenance labor and replacement parts. The technology organization reported a 10% reduction in maintenance costs for its APM customers.
- **Optimized materials or commodities purchases.** Using Azure AI, the retail organization was able to more accurately predict the exact amount of raw material to purchase, and the optimal time to purchase materials to receive the lowest possible price. The program manager of the retail organization said, “The initial target set by the commodities team was to beat the spot price by 1%, which doesn’t sound like a lot. But when you translate it into the volume spent, it does become quite a lot. ... We beat the 1% after about five months.” They evaluated that they could have saved between 8% and 10% of their overall spend by reducing waste from having too much raw material in inventory over the last 10 years if they had been applying the Azure AI models. They also enjoyed greater returns on their budget by having more accurate predictions on the amount of money they needed in the future.

“On these sort of use cases, there wasn’t the capacity or the ability to process the data to be able to produce predictions anywhere near accurate enough from human judgment to make decisions that would override what the [person in charge] would do before we could apply this type of technology.”

Principal AI architect, energy

Modeling and assumptions. Forrester modeled the impact for the composite organization assuming:

- The composite develops AI applications to optimize costs equaling 1% of its total operating costs in Year 1, which grows to 2% of its operating costs in Year 2.
- The organization reduces its overall expenditure in the affected cost streams by 4% in Year 1, 5% in Year 2, and 7% in Year 3.
- Fifty percent of reduced spending can be directly attributed to Azure AI. The predictive and optimization insights from Azure AI provides the biggest enabler of change, although people and process factors are still required to apply the insights effectively to realize cost savings.

Risks. The expected financial impact is subject to risks and variation based on factors including the organization's:

- Scope of deployment and use cases with Azure AI.
- Types of costs faced and opportunities for optimization and cost cutting.
- Level of internal investment in model development and fine-tuning.

Results. To account for these risks, Forrester adjusted this benefit downward by 20%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of \$16.1 million.

Spending Optimization					
Ref.	Metric	Source	Year 1	Year 2	Year 3
B1	Operating costs affected by Azure ML	Composite	\$180,000,000	\$360,000,000	\$360,000,000
B2	Cost savings with Azure ML	Interviews	4%	5%	7%
B3	Azure ML attribution	Interviews	50%	50%	50%
Bt	Spending optimization	B1*B2*B3	\$3,600,000	\$9,000,000	\$12,600,000
	Risk adjustment	↓20%			
Btr	Spending optimization (risk-adjusted)		\$2,880,000	\$7,200,000	\$10,080,000
Three-year total: \$20,160,000			Three-year present value: \$16,141,848		

MANUAL PROCESS AUTOMATION

Evidence and data. Process automation not only helped grow revenue, but also allowed employees to focus on higher-value work, thus increasing their productivity. The type of process automated and the level of automation varied across organizations, ranging from account or transaction monitoring and fraud detection, demand forecasting, remote operations, equipment monitoring, document intelligence, and data verification. Examples of customers saving their employee's time with Azure AI included:

- **Shortening the time required to complete manual work.** The partner working in professional services described highly scalable savings from automating most of their auditing process with Azure AI and reducing the number of documents auditors had to manually review. They said, "Doing Document Intelligence on [our auditor and tech] platforms and using ML to run audit procedures is driving massive savings." An implementation team of seven people at the aviation organization that builds and refines document templates for new customers found that Azure's sophistication and accuracy saved them time previously spent tuning and retuning models to fit templates. The senior principal of digital shared: "Typically, it would take around three to four days for one template. Now it's within hours because the results are pretty remarkable. ...[With] the time they needed to focus on doing the template tuning, [they can] now focus on other things that is more value-added to our customers."

"After seven weeks, you've immediately automated what one person was spending four or five hours every day doing, manually extracting data from PDF files."

Principal AI architect, energy

- **Eliminating the need for human involvement in processes.** The energy organization uses Azure Cognitive Services' knowledge mining and vision capabilities to take highly unstructured data and combine it with structured operational data, to automatically build and update digital twins of large equipment. The principal AI architect in this organization described an immense improvement in quality with Azure AI: "A 3D construction model to build a massive asset might have 70 to 80 million component parts. Generally, [over] 20% will be incorrect, so you don't have confidence to translate it directly into the digital twin, and that requires a huge army of people to inspect or check it against our reference data and work out all the corrections that need to be done. That's what we are proving can be delegated to Azure AI."

The digital twins enable remote operations, which saved the energy organization \$117 million a year by eliminating the costs of training people and sending them to remote areas to verify and manage the equipment. The principal AI architect said, "We're so confident on high fidelity digital twins. Everyone in the supply chain can do it remotely."

The retail organization's procurement commodities team used Azure ML to take over forecasting of price and demand for raw and packaging materials. This work was previously

Reduction in manual work
80%



done by seven or eight very senior-level financial research analysts who were experts on the different materials. The research analysts either left the organization or their roles evolved to undertake new tasks.

Modeling and assumptions. Forrester modeled the impact for the composite organization assuming:

- The composite applies AI to automate manual processes done by a team of 16.
- Azure AI reduces the manual effort required by 80%.
- Fifty percent of the automation can be directly attributed to Azure AI, reducing the effective required project FTE employees by six.
- The project team members had fully burdened annual salaries of \$119,700 on average.

Risks. The expected financial impact is subject to risks and variation based on factors including the organization's:

- Azure AI scope of deployment and use cases.
- Types of costs faced and opportunities for optimization and cost cutting.
- Level of internal investment in model development and fine-tuning.
- Number of project team members and their compensation amounts and structures.
- Unique business requirements and complexities that may reduce potential time savings.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of \$1.6 million.

Manual Process Automation					
Ref.	Metric	Source	Year 1	Year 2	Year 3
C1	Prior project team size	Composite	16	16	16
C2	Decrease in required project time	Interviews	80%	80%	80%
C3	Azure AI attribution	Interviews	50%	50%	50%
C4	Reduction in required project FTE attributable to Azure	C1*C2*C3	6	6	6
C5	Average project team member fully burdened annual salary	TEI Standard	\$119,700	\$119,700	\$119,700
Ct	Manual process automation	C4*C5	\$718,200	\$718,200	\$718,200
	Risk adjustment	↓10%			
Ctr	Manual process automation (risk-adjusted)		\$646,380	\$646,380	\$646,380
Three-year total: \$1,939,140			Three-year present value: \$1,607,451		

OPERATIONAL EFFICIENCY

Evidence and data. Azure offers organizations an efficient and scalable way to develop, train, and validate ML models, thus improving the productivity of data scientists working on ML activities. Customers stated that Azure ML simplified data infrastructure management, modernized template and ML model development, training, validation, deployment, and fine-tuning. Engineers gained access to AI and ML methods and frameworks, accelerating production and overall lifecycles. Ultimately, Azure AI enabled the deployment of more models and applications.

- Multiple interviewees mentioned that consolidating and integrating their data and applications with one provider simplified processes. The partner at the professional services firm described, “Having [all our data] in one player with the hyperscalability makes things much easier.”
- The aviation organization was previously working with another OCR tool that required heavy customization, incurring a lot of time to set up and train the solution. The senior principal of digital in this organization noted: “Before [Azure OCR], it took us three months with six engineers to [train an instance] with the open source process. With [Azure OCR], we are cutting down from three months of engineering time with six people. [Now,] we have one engineer who takes two weeks.” They also noted improved productivity in maintenance and implementation.
- The principal AI architect at the energy organization described efficiencies of Azure AI’s use with other products from the Microsoft ecosystem. They said: “With Cognitive Services and the workflow with things like Power Apps and MS Flow, you can quickly and easily operationalize something as a business workflow to replicate what the business was doing. Over time, you can industrialize it by moving more of it service side so you can scale it.” They noted that

Azure Cognitive Service’s multivariate anomaly detection model reduced the full lifecycle of development through production to deploy each new piece of modelled equipment from six weeks to one week. They believed that the next stage of automation would reduce that timeline to a full lifecycle in one day.

- The program manager in retail worked to create processes with Azure AI that were repeatable and efficient. They told Forrester: “We’ve come up with a very robust, tried, and proven methodology where we can onboard pretty much any new use case with a consistent approach and come out with an initial model in a very short period of time.” They also noted that they tried to set up as much of a hands-off solution as they could, automating alerts to remove human oversight. They described: “We have automated outlier detection on the raw data ingestion, on either missing or inaccurate data. When we do the modeling, we have outlier detection in terms of the model accuracy. If we see a significant drop in the model accuracy based on new data, we have alerts, so one of our end-users on the procurement team should already have been alerted and reacted to it in order to ensure that

“[Azure AI] is crafted and served so software engineers and cloud engineers can deliver those solutions. That massively brings down the total cost of ownership and the speed that you can scale [models]. That’s really the differentiator I’d say right now with Azure AI.”

Principal AI architect, energy

operations are not introducing incorrect numbers.”

- **Reduced error rates.** Azure AI outperformed previous predictive, identification, or processing outputs, whether they were performed by humans or other technologies.

The partner at the professional services organization described large time savings by reducing the rate of false fraud identification in their transaction monitoring services. They said: “Where we utilize ML, we have seen reductions in the false positive [rate] of 80%. You can imagine the time that you can save because if you perform a false positive handling — it consumes a lot of resources.”

The senior principal in aviation explained that using Azure’s OCR in replace of their prior OCR tool reduced their document error rate from 4% to 1.5%. Customers generate support tickets for errors or if documents take longer than three or four hours to arrive. The organization saw a

direct impact of the reduced error rate when Azure AI decreased that ticket volume by 40%.

The retail organization’s program manager described that while some of their spending was previously misclassified due to data errors in their budgeting process, Azure AI identified outliers so they could reclassify the spending and rectify the errors.

Modeling and assumptions. Forrester modeled the impact for the composite organization assuming:

- The composite applies ML to help a team of eight data scientists and engineers.
- Azure AI reduces the effort required by 15% in Year 1, and 25% in Years 2 and 3.
- Data scientists and engineers have fully burdened annual salaries of about \$156,940, or \$75 per hour, on average.
- The organization processed 2 million pages per year for customer work before the investment in Azure AI and had a document error rate of 4%.
- With Azure AI, the organization reduces their document error rate by 60% with Azure AI.
- On average, customer success employees spend 20 minutes dealing with each error.
- Customer success managers have fully burdened annual salaries of about \$93,000, or \$45 per hour, on average.
- Each FTE recaptures 50% of their saved time into productivity value.

Risks. The expected financial impact is subject to risks and variation based on factors including the organization’s:

- Azure AI scope of deployment and use cases.
- Level of previous investment in internal AI or ML workstreams.

“We’ve never had a performance issue where we were being slowed down by technology. We have all the fuel for growth, it’s more question of use cases and we onboard any new use case very quickly because the technology is not a detractor for us and we have the methodology as well ... It’s extremely efficient technology.”

Program manager, retail

- Previous number of documents processed and document error rate, as well as the consequences of errors and time spent fixing them.
- Level of internal investment in model development and fine tuning.
- Number of project team members and their compensation amounts and structures.

- Unique business requirements and complexities that may reduce potential time savings.

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 \$1 million.

Operational Efficiency					
Ref.	Metric	Source	Year 1	Year 2	Year 3
D1	Data scientist and engineer FTEs working on ML before investment	Composite	8	8	8
D2	Time savings using Azure AI and ML	Interviews	15%	25%	25%
D3	Time savings recapture rate	TEI Standard	50%	50%	50%
D4	Recaptured hours	D1*2080*D2*D3	1,248	2,080	2,080
D5	Average data scientist and engineer fully burdened hourly salary	TEI Standard	\$75	\$75	\$75
D6	Subtotal: Improved data scientist and ML engineer productivity	D4*D5	\$94,164	\$156,940	\$156,940
D7	Annual number of pages processed before investment	Composite	2,000,000	2,000,000	2,000,000
D8	Previous error rate	Composite	4%	4%	4%
D9	Error reduction with Azure AI	Interviews	60%	60%	60%
D10	Hours spent on error remediation per error on average	Interviews	0.33	0.33	0.33
D11	Time savings recapture rate	TEI Standard	50%	50%	50%
D12	Recaptured employee hours from reduced errors	D7*D8*D9*D10*D1 1	7,920	7,920	7,920
D13	Average employee fully burdened hourly salary	TEI Standard	\$45	\$45	\$45
D14	Subtotal: Savings from reduced errors	D12*D13	\$356,400	\$356,400	\$356,400
Dt	Operational efficiency	D6+D14	\$450,564	\$513,340	\$513,340
	Risk adjustment	↓15%			
Dtr	Operational efficiency (risk-adjusted)		\$382,979	\$436,339	\$436,339
Three-year total: \$1,255,657			Three-year present value: \$1,036,602		

RETIRED LEGACY TECHNOLOGY

Evidence and data. The interviewee’s organizations decommissioned legacy on-premises and third-party point solutions in favor of Microsoft Azure’s pay-for-what-you consume cloud licensing model. In making this investment, organizations realized savings from legacy licensing, maintenance, administration, and support costs.

- The partner at the professional services organization described realizing savings by investing in Azure AI in data infrastructure, software, and the labor associated with integration and ongoing maintenance. They said: “At the earlier stages we had our own servers and open source [tools] with Python code and different frameworks to connect the front and back end, which was super manual. The maintenance of all those stacks, and budgeting [them] was super complex. ... Working with a hyperscaler [solves for that].”
- The program manager in retail mentioned a major transformation of their organization’s entire data landscape into Azure cloud pipelines and a data lake. They described, “[Now] we pay for a service, and for consumption, but it’s much easier to manage. Before, you needed an entire team of accountants just to manage the deprecation on the technologies that we had.”
- The senior principal of digital at the aviation firm said: “We don’t have to maintain the OCR infrastructure anymore. It’s a Microsoft problem. It allowed [engineers] to focus more on [other things]. It took them an average of two hours per week per engineer to troubleshoot issues. Now we are down to zero because we offload [the work] to Azure.”

Modeling and assumptions. Forrester modeled the impact for the composite organization assuming:

- The composite previously spends \$42,000 annually on on-premises data infrastructure and licensing.
- The composite previously spends \$10,500 in labor to support the on-premises infrastructure.
- The composite, upon moving to cloud-based Azure AI, retires 20% of the previous technology in Year 1, 40% in Year 2, and 85% in Year 3.

Risks. The expected financial impact is subject to risks and variation based on the organization’s:

- Previous data infrastructure and associated software and maintenance costs and its ability to retire solutions after the investment in Azure AI.
- Percentage of legacy solutions decommissioned and percentage of on-premises solutions moved to the cloud.

“Before, we didn’t have the maturity around ML. Now that we do, we can move away from a subscription-based tool which is not cheap and go to a consumption-based tool like Azure, where 100% of what we build is an asset to [our organization], which is a big plus for us.”

Program manager, retail

Results. To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of \$57,000.

Retired Legacy Technology					
Ref.	Metric	Source	Year 1	Year 2	Year 3
E1	Cost of legacy on-premises licensing and infrastructure	Composite	\$42,000	\$42,000	\$42,000
E2	Cost of legacy on-premises support	Composite	\$10,500	\$10,500	\$10,500
E3	Percentage of legacy solutions decommissioned	Composite	20%	40%	85%
Et	Retired legacy technology	$(E1+E2)*E3$	\$10,500	\$21,000	\$44,625
	Risk adjustment	↓5%			
Etr	Retired legacy technology (risk-adjusted)		\$9,975	\$19,950	\$42,394
Three-year total: \$72,319			Three-year present value: \$57,407		

UNQUANTIFIED BENEFITS

Interviewees mentioned the following additional benefits that their organizations experienced but were not able to quantify:

- **Optimized budgeting and reallocated spending leading to greater returns.** The principal AI architect at the energy organization described that decision-makers used cost models and revenue projections from Azure AI to get the best capital efficiency possible: “[Decision-makers] can really deploy [their budgets] for commercial value, because the variance between the accuracy of forecasts and what actually happens is now dramatically reduced.”
- **Faster and higher quality decision making.** The partner in the professional services organization described, “We went from getting no answers to getting answers in a very good timeframe.” The retail program manager also mentioned that predictions from Azure AI influenced decisions at the executive board level.
- **Greater innovation and cross-team alignment.** The same program manager told Forrester: “[Azure AI has] given us a data-driven mindset, which has gone across multiple other use cases now.” They described that having some successful use cases from the start to demonstrate value helped AI technology gain credibility with the business side of the organization as a true unlocker of business potential. They said, “It’s a way to get [the IT and business] teams to work as one team.”
- **Improved employee safety.** The principal AI architect at the energy organization mentioned that enabling remote equipment operations and monitoring removed significant human safety risks from employees or contractors previously flying out to remote places to inspect heavy machinery in person. The organization also used Azure Custom Vision to ensure safety standards were abided. They said, “With things like Azure

Custom Vision, you’re identifying and classifying objects and in real time, making risk assessments that then get flagged up to [take] action, saying, [for example]: ‘because we’re doing this production process, we shouldn’t have people in that area because they don’t have the right protective equipment.’”

- **Enhanced model compliance and governance, and insurance of responsible AI/ML practices.** Microsoft espouses a high commitment to responsible AI development and advancement. Azure AI can help organizations quantify model fairness, robustness, and security, and ensure that their models are governed properly and adhere to ethical principles.
- **Reduced greenhouse gas emissions.** The principal AI architect at the energy organization highlighted that by reducing fuel use of shipping vessels, Azure AI was helping the organization

“Where we’ve been ahead in specific areas is mostly because we’ve done something in each vendor or custom build where we’ve gone with Azure Cognitive Services and that kind of wrap around support you get from Microsoft. Most of time, that ends up winning out because we’ve got a successful prototype, and it’s much easier to scale and realize value from it.”

Principal AI architect, energy

get closer to its goal of reaching net zero emissions.

- **Improved EX.** By releasing employees from routine, manual tasks, employees can spend a higher percentage of their time on more engaging work. Azure AI as a highly-valued technology may also be beneficial for recruiting. The principal AI architect in energy noted, “[Azure AI is] one of our major selling points when [our engineers] go out and recruit graduates in the market.”
- **Reduced risk.** AI helps organizations more effectively identify and manage risk and reduce the risk of compliance violations, penalties, or fines. Similarly, predictive analytics use cases allow anticipation for future events such as equipment failure or customer behavior, enabling decision-makers to proactively take action to mitigate risk. For example, the principal architect at the energy organization said their organization used Azure custom vision to identify people smoking at flammable, high-risk areas like gas stations or near gas pipelines.

FLEXIBILITY

Flexibility represents additional capabilities that could be turned into future business benefit, providing an organization with the ability to engage in future initiatives. The value of flexibility is unique to each customer. Scenarios in which a customer might implement Azure AI and later realize additional uses and business opportunities include:

- **Further operationalizing AI across an organization.** As AI becomes more affordable, it is expanding beyond standard use cases to be used by roles beyond data scientists to provide value across most parts of a business. The principal architect of AI in energy said, “Just every use case you might think of, retail or finance or insurance, effectively, [AI is] part of some business and is being applied.” Organizations can continue to increase the value

of their AI development by building off existing applications.

“Today, you can spin up a system in Azure for next to nothing. You can get a use case with a valid output for minimal investment and already get your buy in.”

Program manager, retail

- **Improved innovation, strategy, and productivity by de-risking AI and ML.** The same technological progress that has made AI and ML more affordable and accessible across organizations spurs innovation by allowing more roles to think creatively about its usage. The program manager at the retail organization described, “[Azure AI has] allowed us to take away the guardrails of financing being a constraint and allows people to come [forward] with an idea.” The principal AI architect at the energy organization echoed: “There’s an opportunity to test the value very quickly and see if it’s there before making the big investments that you might spend four or six months doing to build an apps or something that could be globally deployed.”
- **Capitalization on cutting-edge technological innovation.** Organizations with institutional knowledge and an established AI or ML team working with Azure AI can realize value from new products or advances in technological capabilities much sooner than others. The partner at the professional services organization noted that their partnership with Microsoft allowed them to access new products, “We are continuously

bonding with Microsoft and getting support on the next products in terms of AI and also ML.”

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

“It’s not even so much on a transactional level with each individual transaction that you see the benefits. It’s really a different way of thinking. It’s a mindset change.”

Program manager, retail

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
Ftr	Azure AI consumption and services	\$220,000	\$418,000	\$583,000	\$693,000	\$1,914,000	\$1,602,479
Gtr	Implementation, application building, and training	\$847,601	\$701,130	\$256,418	\$7,853	\$1,813,001	\$1,702,807
Htr	Management and quality assurance labor	\$0	\$1,990,262	\$2,104,974	\$1,798,692	\$5,893,928	\$4,900,361
	Total costs (risk-adjusted)	\$1,067,601	\$3,109,392	\$2,944,392	\$2,499,545	\$9,620,930	\$8,205,647

AZURE AI CONSUMPTION AND SERVICES

Evidence and data. Azure AI Services and Azure ML are priced according to the type of capability or use case and based on usage. For example, pricing for Cognitive Services computer vision and language understanding is based on the number of transactions or text records, while Forms Recognizer is priced per page, and Open AI service is priced per tokens or training or hosting hours. Azure ML pricing is based on machine learning and data storage consumption. Pricing also varies by region and depends on the specific characteristics and needs of the respective organizations.

- Within Cognitive Services, customers can control the timing of their spend with archival backlogs. Archival backlogs allow organizations to choose to run their AI service in batches when information is needed or when it's in their best interest to incur the costs, without incurring costs in between batches.
- Interviewees leveraged additional supporting services like Azure Synapse, Power Apps, or Power BI to integrate data pipelines and operationalize insights. Data storage or cloud transaction costs may be incurred as separate costs.

- Most of the customer organizations were enterprise, managed accounts with Microsoft and received support and training from Microsoft's teams as part of their Azure AI purchase. The principal AI architect in energy described that the Microsoft team was heavily involved for innovative models, with up to two or three full-time consultants working with their team. For use cases that were already established, Microsoft was barely involved if at all.
- The head of digital portfolio management at the technology company and the partner at the professional services organization both expressed appreciation for Microsoft's partnership and level of technical support. The program manager in retail also noted Microsoft's

“What is really incredible is also the technical support that we can receive whenever we have an issue. We have direct access.”

Partner, professional services

helpfulness with the release of new features, saying: “When new features like AutoML came out, we got demonstrations and deep dives on its uses so we were able to onboard it within some of our use cases. [Microsoft has] always played a very active role in helping us continue to expand [our use of Azure AI].”

Modeling and assumptions. Forrester modeled this cost based on the following information:

- The composite organization pays \$200,000 for its use of Azure Cognitive and Applied AI Services in the initial period. It pays \$250,000 in Year 1, \$300,000 in Year 2, and \$350,000 in Year 3.
- The composite organization pays \$100,000 for Azure ML in Year 1, \$200,000 in Year 2, and \$250,000 in Year 3, scaling up as data consumption and computation needs increase.

- Microsoft implementation and support services will cost the organization \$30,000 per year starting in Year 1.

Risks. Pricing of Azure AI varies depending on its:

- Region, use case, usage, and variance in compute and storage consumption as well as an organization’s characteristics. Contact Microsoft for additional details.

Results. To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of \$1.6 million.

Azure AI Consumption And Services						
Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
F1	Azure Cognitive and Applied AI Services	Microsoft	\$200,000	\$250,000	\$300,000	\$350,000
F2	Azure ML compute and storage	Microsoft		\$100,000	\$200,000	\$250,000
F3	Microsoft implementation and support services	Microsoft		\$30,000	\$30,000	\$30,000
Ft	Azure AI consumption and services	F1+F2+F3	\$200,000	\$380,000	\$530,000	\$630,000
	Risk adjustment	↑10%				
Ftr	Azure AI consumption and services (risk-adjusted)		\$220,000	\$418,000	\$583,000	\$693,000
Three-year total: \$1,914,000			Three-year present value: \$1,602,479			

IMPLEMENTATION, APPLICATION BUILDING, AND TRAINING

Evidence and data. The interviewees' organizations incurred upfront internal labor costs from time spent on implementation and change management as well as labor costs associated with the time internal employees spend receiving training on the Azure AI solutions. Implementation timelines for the interviewee's organizations ranged from one week for bare bones setup to 18 months for full model training before deployment. On average, it took about six weeks for technological and data setup, but about six months to complete application building and to get models in production. Overall, timelines greatly depended on the organization's level of technical expertise and the sophistication or level of customization of their use cases. Multiple interviewees noted the strength of their organization's partnership with Microsoft as an asset during implementation, as they received free structured training or guidance from the Microsoft team. Interviewees reported that custom training on the Azure ML platform was intensive, but training on Cognitive Services was lightweight, and both depended on the previous experience that the organization's engineers or data scientists had. Over time, teams could deploy new models more quickly. The head of digital portfolio management at the technology organization described: "A lot of our team members were already aware of Azure and had worked on Azure technology, and our partnership with Microsoft helps us a lot. So, setting up the Azure instance is not a problem — our guys do it in a day or two days."

Modeling and assumptions. Forrester modeled this cost based on the following information:

- Initial work on data and technological infrastructure setup, application building, model training, and refinement takes nine months and

makes up 80% of the work conducted by a team of six engineers.

- Four engineers work on the AI applications involved in the development of the organization's new product offering through the first third of Year 2.
- The organization's AI/ML engineers and data scientists each spend a total of 80 hours receiving training and learning about Azure AI.

The fully burdened monthly salary of the average engineering resource is \$14,690, or \$85 an hour.

Risks. The expected investment is subject to risks and variation based on several factors that may increase costs or extend deployment, including:

- An organization's deployment size, legacy technology landscape, maturity of existing processes, and the level of change needed to deploy Azure AI, especially alongside any cloud migration or adoption efforts.
- An organization's unique organizational requirements, processes, or technology complexities that can limit or lengthen implementation, such as regional regulatory demands, specific integrations, or high data access and protection requirements.
- The size, expertise, skillset, and labor cost of existing technical and business user resources and internal deployment teams, as well as the training method and delivery mechanism.

Results. To account for these risks, Forrester adjusted this cost upward by 15%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of \$1.7 million.

Implementation, Application Building, And Training						
Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
G1	Months of work on implementation, application building, and refinement	Interviews	9	12	4	0
G2	Number of FTE engineers involved in application building and refining	Interviews	6	4	4	0
G3	Percentage of time spent on Azure AI application building and refining	Interviews	80%	70%	60%	0%
G4	Average monthly fully burdened salary of implementation employees	TEI Standard	\$14,690	\$14,690	\$14,690	\$0
G5	Subtotal: Implementation and application building	$G1 \times G2 \times G3 \times G4$	\$634,608	\$493,584	\$141,024	\$0
G6	Number of engineers trained on Azure AI	Composite	15	17	12	1
G7	Hours of training per new engineer	Interviews	80	80	80	80
G8	Average hourly fully burdened engineer salary	TEI Standard	\$85	\$85	\$85	\$85
G9	Subtotal: Training	$G6 \times G7 \times G8$	\$102,436	\$116,094	\$81,948	\$6,829
Gt	Implementation, application building, and training	$G5 + G9$	\$737,044	\$609,678	\$222,972	\$6,829
	Risk adjustment	↑15%				
Gtr	Implementation, application building, and training (risk-adjusted)		\$847,601	\$701,130	\$256,418	\$7,853
Three-year total: \$1,813,001			Three-year present value: \$1,702,807			

MANAGEMENT AND QUALITY ASSURANCE LABOR

Evidence and data. Ongoing administration and management of Azure AI mainly consists of solution monitoring and bug fixing, retesting and optimization, maintaining data storage and integrations, and internal auditing of and reporting on models. Most organizations started by developing one or two AI applications or use cases, then trained and retrained them until they were more or less autonomous, and then moved to new use cases. The principal architect at the energy organization told Forrester that their DevOps team might spend 5 to 10% of their capacity doing retraining and monitoring in production for more generic models, but custom models could take over half of their time. AI/ML engineering and development teams at the interviewee's organizations grew with their use of AI, reaching six to over 50 members after three to five years.

Modeling and assumptions. Forrester modeled this cost based on the following information:

- In Year 1, 15 AI/ML engineers support Azure AI, which increases to 30 in Year 2 and 40 in Year 3.
- The percentage of the engineer's time spent managing and optimizing the modeled use cases decreases over time, from 50% in Year 1, to 25% in Year 2, and 15% in Year 3.
- A four- and then five-person QA team provides ongoing oversight of the models to ensure the quality and usability of the outputs.
- The burdened annual cost of an average AI/ML engineer is \$177,555, and the burdened annual cost of quality assurance resources is \$99,750.

Risks. Actual training and management labor costs will vary per organization depending on the following:

- The complexity of an organization's workflows, data environment and scope of Azure AI deployment, including both the number of employees involved and scope of work conducted.
- Unique business needs such as regional compliance and governance.
- The level of quality assurance or human oversight required for usable model output.
- Frequency of updates to training data and model retraining required for sustained quality.
- Compensation amounts and structures for each employee involved in QA work and ongoing management.

Results. To account for these risks, Forrester adjusted this cost upward by 15%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of \$4.9 million.

“Even though we have very complex models and fully automated solutions, from a cost perspective, it's less than one Swiss-based FTE.”

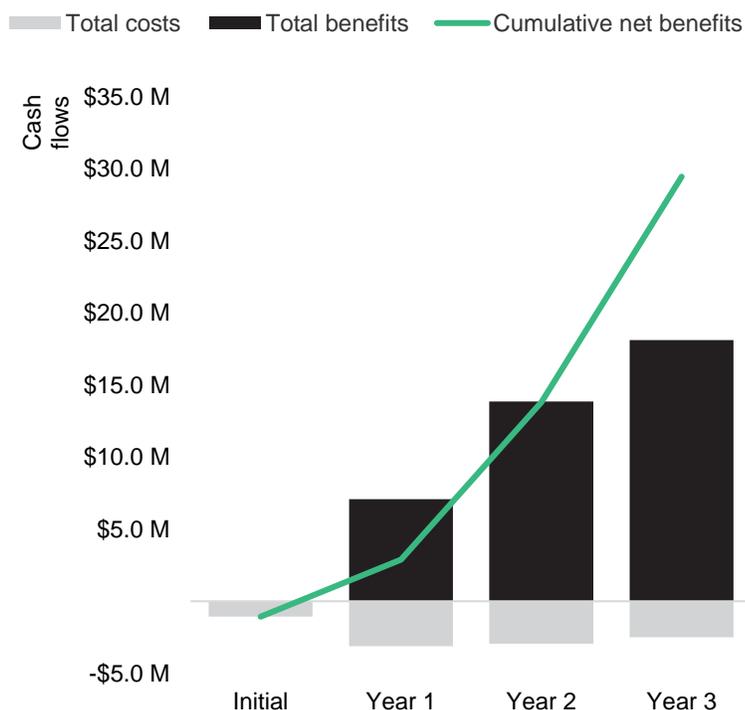
Program manager, retail

Management And Quality Assurance Labor						
Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
H1	AI and ML engineers	Composite	0	15	30	40
H2	Percentage of time spent on Azure AI modeled use cases	Interviews	0%	50%	25%	15%
H3	Average fully burdened annual salary of AI/ML engineer	TEI Standard	\$0	\$177,555	\$177,555	\$177,555
H4	QA team of FTE employees	Composite	0	4	5	5
H5	Average annual fully burdened salary QA employee	TEI Standard	\$0	\$99,750	\$99,750	\$99,750
Ht	Management and quality assurance labor	$(H1*H2*H3)+(H4*H5)$	\$0	\$1,730,663	\$1,830,413	\$1,564,080
	Risk adjustment	↑15%				
Htr	Management and quality assurance labor (risk-adjusted)		\$0	\$1,990,262	\$2,104,974	\$1,798,692
Three-year total: \$5,893,928			Three-year present value: \$4,900,361			

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	(\$1,067,601)	(\$3,109,392)	(\$2,944,392)	(\$2,499,545)	(\$9,620,930)	(\$8,205,647)
Total benefits	\$0	\$7,074,959	\$13,868,044	\$18,128,363	\$39,071,366	\$31,513,082
Net benefits	(\$1,067,601)	\$3,965,568	\$10,923,652	\$15,628,817	\$29,450,436	\$23,307,435
ROI						284%
Payback period (months)						<6

Appendix A: Total Economic Impact

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

TOTAL ECONOMIC IMPACT APPROACH

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

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

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

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

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



PRESENT VALUE (PV)

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



NET PRESENT VALUE (NPV)

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



RETURN ON INVESTMENT (ROI)

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



DISCOUNT RATE

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



PAYBACK PERIOD

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

Appendix B: Supplemental Material

“The Forrester Wave™: AI/ML Platforms, Q3 2022,” Forrester Research, Inc., July 12th, 2022.

“Enterprises Must Invest In AI Platforms To Empower Multirole AI Teams,” Forrester Research, Inc., August 26th, 2022.

“Global AI Software Forecast, 2022,” Forrester Research, Inc., September 29th, 2022.

“Predictions 2023: Artificial Intelligence,” Forrester Research, Inc., October 27th, 2022.

“Enterprises Must Invest In AI Platforms To Empower Multirole AI Teams,” Forrester Research, Inc., August 26th, 2022.

Appendix C: Endnotes

¹ Source: “Predictions 2023: Artificial Intelligence,” Forrester Research, Inc., October 27th, 2022.

² Source: “Global AI Software Forecast, 2022,” Forrester Research, Inc., September 29th, 2022.

³ Source: “Enterprises Must Invest In AI Platforms To Empower Multirole AI Teams,” Forrester Research, Inc., August 26th, 2022.

⁴ 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.

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