

A Forrester Total Economic Impact™
Study Commissioned By Microsoft
April 2019

The Total Economic Impact™ Of Microsoft Azure Archive Storage

Cost Savings And Business Benefits
Enabled By Azure Archive Storage

Table Of Contents

Executive Summary	1
Key Findings	1
TEI Framework And Methodology	4
The Azure Archive Storage Customer Journey	5
Interviewed Organizations	5
Key Challenges	5
Key Results	6
Composite Organization	6
Analysis Of Benefits	7
Eliminated On-Premises Archive Storage Spending	7
Cloud Storage Savings in Archive Tier	8
Unquantified Benefits	9
Flexibility	10
Analysis Of Costs	11
Fees For Data Transfer	11
Cost Of Storage	12
Cost Of Retrieval And Reading	13
Personnel Costs For Data Migration	14
Ongoing Personnel Costs For Storage Management	15
Financial Summary	17
Microsoft Azure Archive Storage: Overview	18
Appendix A: Total Economic Impact	19

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Benefits And Costs



Eliminated on-premises archive storage spending:

\$173,249



Cloud storage savings in Archive Tier:

\$123,692



Reduction in per GB monthly cloud storage expenses:

95%

Executive Summary

Infrastructure and operations teams, that are managing significant amounts of data, are leveraging object storage systems both on-premises and in the public cloud. Beyond the cost advantage, organizations can use object storage services from cloud storage providers to store massive amounts of unstructured data. For example, organizations can serve images or documents directly to a browser or application, store files for distributed access, stream video and audio, write log files, store data for analysis by on-premises or cloud-hosted services, backup, disaster recovery, and archiving.

Microsoft Azure Blob Storage provides a scalable and secure cloud-based object storage solution that helps its customers store massive amounts of unstructured data in a cost-efficient manner. In addition to integration with a broad array of Azure services and independent software vendor solutions, Azure Blob Storage provides a variety of capabilities to help customers manage their data, control costs, and obtain data insights while meeting compliance requirements. Microsoft commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential ROI enterprises may realize by deploying Azure Archive Storage. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of the Azure Archive Storage on their organizations.

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed several customers that adopted Azure Archive Storage shortly after release. These organizations had already moved their active data to the cloud, utilizing Azure Hot Storage. However, until the release of the Archive Tier there had been no cost-effective way to replace their existing on-premises archive storage solutions. Furthermore, the organizations searched for a way to recognize further storage savings on cloud-native data and infrequently used objects in the Hot Tier.

Prior to using Azure Archive Storage, the customers used a combination of Azure Hot Storage and on-premises storage, primarily magnetic tape, for archive data. However, organizations were unable to fully migrate their unstructured archive data to the cloud in a cost-effective manner. Furthermore, these organizations could not easily move existing cloud data to other tiers. Now, customers can seamlessly tier their data to Hot, Cool, of Archive at all object-levels and manage their data using a consistent set of APIs across all tiers.

Key Findings

Quantified benefits. The following are risk-adjusted present value (PV) quantified benefits. While these are projected three-year benefits for the composite organization, they are based on experiences of the companies interviewed:

- › **Reduced or eliminated operating expenses related to on-premises archive storage.** Organizations were able to reduce spending in their on-premises storage environments by transitioning data to the cloud. Moving to the cloud enabled users: 1) to eliminate their tape and hard disk backups and 2) to reduce overall operating expenditures. Eliminating operating charges as well as capital expenses for hardware refreshes saves a projected \$173,249 over a three-year period.



ROI
112%



Benefits PV
\$296,941



NPV
\$156,565



Payback
7 months

- › **Reduced monthly cloud storage costs by 95%.** Organizations identified infrequently accessed data stored in active cloud storage tiers and transitioned them to Archive Tier — reducing their monthly per gigabyte (GB) storage costs by 95%. Archive Tier allowed organizations to augment their existing cloud storage savings. Over a three-year period, this saves an estimated \$123,692.

Unquantified benefits. The interviewed organizations experienced the following benefits, which are not quantified for this study:

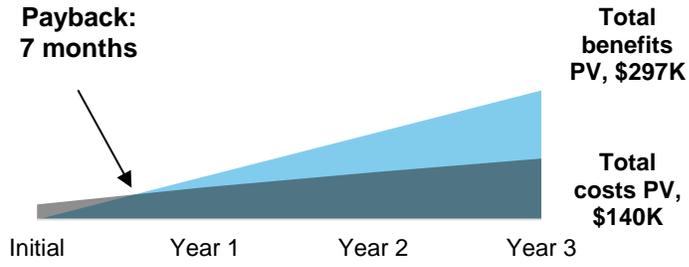
- › **Met legal or internal compliance mandates.** Organizations were frequently required to retain data in order to meet government or internal audit and compliance obligations. Archive Tier along with features such as immutable storage (WORM) from Azure allowed the organizations to retain this data in a cost effective and secure environment.
- › **Improved response times to disaster-recovery events.** Organizations experienced faster response times with scripted recovery, rather than having individuals manually pull tapes and monitor data restoration.
- › **Eliminated costs related to maintaining an offsite disaster recovery center.** Organizations that maintained offsite data centers, in order to retain data copies, were able to reduce their footprints and eliminate annual travel expenses related to maintaining those sites.
- › **Pursued projects with cutting-edge media files and cloud-native data.** Organizations were able to freely explore new projects, creating cloud-native data, and to work with the latest-gen media files without fear of incurring high variable storage costs.

Costs. The composite organization projects to experience the following risk-adjusted PV costs:

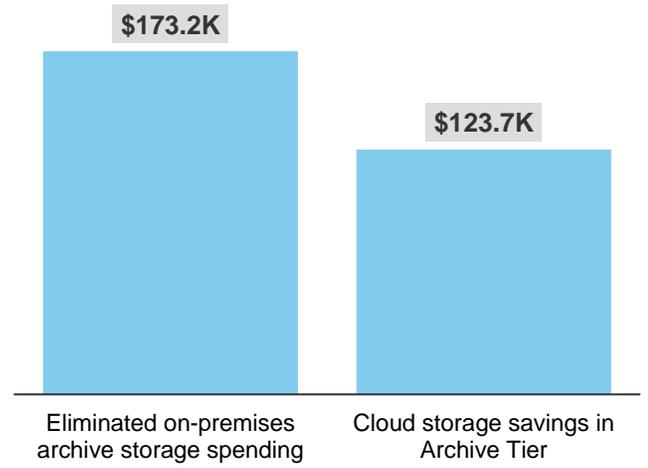
- › **Data transfer fees.** Microsoft charges organizations for the migration of data to the cloud and between tiers within Azure storage. The amount of operations required will vary based on the average size of data objects. The composite organization incurs a projected cost of \$1,363 over a three-year period.
- › **Cloud storage fees.** Archive Tier provides customers with the lowest monthly per GB Azure Storage costs. Over a three-year period, the composite organization projects to pay \$11,835 in storage fees.
- › **Retrieval and reading fees.** Microsoft charges users for the rehydration and use of data stored in Archive Tier. Retrieval and reading fees declined over time as customers better identified which data to Archive from their active tiers. Over a three-year period, these fees are estimated at \$6,745.
- › **Personnel costs for data migration.** Organizations incurred internal labor costs while migrating their on-premises data to the cloud. Over a three-year period, these internal costs are estimated at \$32,175.
- › **Ongoing personnel costs for storage management.** Organizations required FTE resources dedicated to the management of their cloud storage operations. Over a three-year period, internal management costs are estimated to be \$88,258.

Forrester's interviews with four existing customers and subsequent financial analysis found that a composite organization based on these interviewed organizations projects expected benefits of \$296,941 over three years versus costs of \$140,376, adding up to a net present value (NPV) of \$156,565 and an ROI of 112%. For a more detailed explanation please see sections "[Analysis of Benefits](#)" and "[Analysis of Costs](#)".

Financial Summary



Benefits (Three-Year)



The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

TEI Framework And Methodology

From the information provided in the interviews, Forrester has constructed a Total Economic Impact™ (TEI) framework for those organizations considering implementing Microsoft Azure Archive Storage.

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 Microsoft Azure Archive Storage can have on an organization:



DUE DILIGENCE

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



CUSTOMER INTERVIEWS

Interviewed four organizations using Azure Archive Storage to obtain data with respect to costs, benefits, and risks.



COMPOSITE ORGANIZATION

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



FINANCIAL MODEL FRAMEWORK

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



CASE STUDY

Employed four fundamental elements of TEI in modeling Microsoft Azure Archive Storage's impact: benefits, costs, flexibility, and risks. Given the increasing sophistication that enterprises have regarding ROI analyses related to IT investments, Forrester's TEI methodology serves to provide a complete picture of the total economic impact of purchase decisions. Please see Appendix A for additional information on the TEI methodology.

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 report to determine the appropriateness of an investment in Microsoft Azure Archive Storage.

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.

The Azure Archive Storage Customer Journey

BEFORE AND AFTER THE AZURE ARCHIVE STORAGE INVESTMENT

Interviewed Organizations

For this study, Forrester conducted four interviews with Microsoft Azure Archive Storage customers. Interviewed customers include the following:

INDUSTRY	REGION	REVENUE	DATA IN ARCHIVE TIER
Higher education	United States	N/A	60 terabytes
Oil and gas services	United States (global operations)	\$2 billion	600 terabytes
Consumer electronics	Asia (global operations)	\$50 billion	450 terabytes
B2C software	United States	\$50 million	150 terabytes

Key Challenges

Interviewed organizations identified several key challenges that drove their investment in Azure Archive Storage:

- › **Lacked a cost-effective way to replace legacy tape and hard disk storage solutions.** Interviewed organizations stated that prior to Archive Tier being available on Azure, they lacked a way to cost effectively transition their backup and archive data to the cloud. Organizations retained hundreds of terabytes (TB) of infrequently used data on tape as operating costs remained below available cloud storage price tiers.
- › **Needed to retain old data to comply with internal and external mandates.** Some organizations operate under stipulations requiring them to retain old data, regardless of how often it is accessed or how valuable it is to ongoing operations. For example, a university interviewed for this study was required to hold backups of all videos created by its researchers in order to receive government grants. Another organization, offering a B2C media editing platform, was legally required to archive content created by its users.
- › **Required a cost-effective solution to scale storage operations.** Organizations interviewed for this study had launched new products and services which generated tremendous amounts of data. Interviewees stated that they wished to continue innovating and retaining data which may have future value without the fear of incurring significant operating costs to their organization. A VP of product planning and development in the consumer electronics industry said: “We did look at purging – getting rid of the data altogether – but we decided on archiving instead because we thought our retrieval needs would be so few that archiving made more sense.”

“It was a legal need that we needed to be able to act on quickly, so, we purchased [Azure Archive] to fill that legal need and it was the lowest cost, lowest overhead way of achieving that.”

Program manager, B2C software



“We did look at purging – getting rid of the data altogether – but we decided on archiving instead because we thought our retrieval needs would be so few that archiving made more sense.”

VP of product planning and development, consumer electronics



Key Results

The interviews revealed that key results from the Azure Archive Storage investment include:

- › **Reduced annual storage costs.** Organizations using Azure Archive Storage reduced their monthly per GB storage costs when compared to both on-premises and active tier cloud storage. One interviewee using Azure Archive to store high-definition video footage said: “Archive Storage just saves us a lot on the retainment of video. It’s a pretty significant amount. I’d say it’s about a tenth of the cost right now compared to our normal storage.”
- › **Retired legacy on-premises archive storage solution.** Azure Archive Storage provided customers with a low-cost alternative to their legacy storage solutions. Customers eliminated tape and hard disk dedicated to archive data. Retiring legacy solutions terminated expenses related to maintenance, power, cooling, facilities management, hardware refreshes, and reduced FTE time dedicated to overseeing operations.
- › **Fulfilled business and legal compliance mandates.** Organizations had numerous legal and business obligations to fulfill in storing archive data. Azure Archive provided them with a secure and cost-effective way to meet these mandates. A program manager said, “It was a legal need that we needed to be able to act on quickly and we purchased [Azure Archive] to fill that legal need and it was the lowest cost, lowest overhead way of achieving that.”
- › **Provided scalable storage solution for future endeavors.** Organizations no longer had to worry about future growth of data and bloated file sizes created by new products or services, or accommodating advances in media. Multiple interviewed organizations stored video data and had no concerns about the financial impact of upgrading to the latest file types such as 4K video.

Composite Organization

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

- › The composite organization is a US-based B2B enterprise with global operations. The organization stores unstructured data, including videos and photos, created by their B2B services. The organization collects and stores this data for: 1) disaster recovery and 2) to meet legal compliance obligations.
- › The organization is based on the West Coast of the United States, using Locally Redundant Storage (LRS) in the US West 2 region.
- › Prior to using Azure Archive, the organization stored their data in the cloud in Hot Tier, as well as in an on-premises backup location. The organization had a total of 350 TB of data, with 150 TB stored in on-premises backup.
- › The average object size stored in Azure Archive is 4 megabytes (MB).

“The reason we’re using it for this one application is because it was already in Azure, it was born on Azure platform-as-a-service and so it’s a no-brainer to use this.”

VP of product planning and development, consumer electronics



“Archive Storage just saves us a lot on the retainment of video. It’s a pretty significant amount. I’d say it’s about a tenth of the cost right now compared to our normal storage.”

Digital innovation director, oil and gas services



Key assumptions:

- › 150 TB stored in on-premises archive
- › 200 TB moved from Hot to Archive
- › 25% annual growth in cloud-native data
- › 4 MB average object size

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	Eliminated on-premises archive storage spending	\$69,398	\$69,683	\$69,973	\$209,053	\$173,249
Btr	Cloud storage savings in Archive Tier	\$39,695	\$49,619	\$62,023	\$151,336	\$123,692
	Total benefits (risk-adjusted)	\$109,092	\$119,301	\$131,996	\$360,390	\$296,941

Eliminated On-Premises Archive Storage Spending

The composite organization completely replaced their on-premises archive storage environment, moving to the cloud with Azure Archive Storage. Prior to migrating to the cloud, the organization had stored their backups and archival data on hard disks and magnetic tape. Despite moving actively stored data and other workloads to the cloud, the organization retained their legacy archival system. The organization had difficulty justifying the discontinuation of their legacy storage hardware and moving to a more expensive cloud storage solution. With the creation of Archive Tier on Azure, the composite organization could finally migrate their remaining archival data to the cloud.

Migrating to the cloud enabled the composite organization to eliminate their on-premises archival operating expenses: power, cooling, facilities, maintenance, hardware refreshes, and reduced FTE hours.

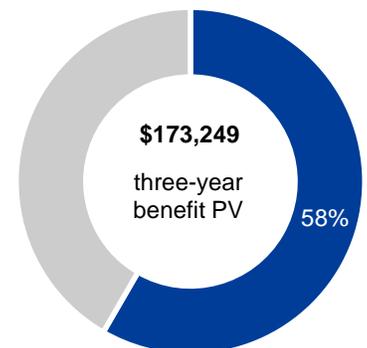
Interviewed organizations archived a wide variety of data types: high-definition videos, user-created videos and photos, and operational logs from IoT consumer electronics devices. Organizations retained this data in order to comply with legal obligations, to maintain research grants, and to hold for future analysis.

In modeling the impact of Azure Archive Storage on on-premises operating expenses, Forrester made the following assumptions:

- › The composite organization stored 150 TB of unstructured archival data on a mix of magnetic tape and hard disk. The average capital value per usable GB in the on-premises environment is \$0.50.
- › Annual power, cooling, and maintenance charges are 5% of the total storage capital value.
- › Annual maintenance charges are 15% of the total storage capital value.
- › Annually, the organization refreshes 15% of their hardware.
- › The average data center FTE manages 250 TB and has a fully burdened salary of \$78,000.
- › Power, cooling, facilities, and maintenance costs are growing at 2% annually.

Forrester realizes that archive storage costs and the associated savings will vary across companies, countries, and industry verticals. Specific risk

The table above shows the total of all benefits across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the composite organization expects risk-adjusted total benefits to be a PV of \$296,941.



Eliminated on-premises archive storage spending: **58%** of total benefits

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

considerations include:

- › Geographic location of data center and prevailing utility market rates.
- › Size and scope of archive storage operations.
- › Mix of archival storage mediums and related costs.

To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a projected three-year risk-adjusted total PV of \$173,249.

Eliminated On-Premises Archive Storage Spending: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3
A1	Data stored on-prem (TB)		150	150	150
A2	Capital value of on-premises storage including operations	$((A1*1,000)*.5)$	\$75,000	\$75,000	\$75,000
A3	Annual power, cooling, and facilities charges	$A2*0.05$ (growing 2% YOY)	\$3,750	\$3,825	\$3,902
A4	Annual maintenance charge	$A2*0.15$ (growing 2% YOY)	\$11,250	\$11,475	\$11,705
A5	Avoided hardware refresh	$A2*0.15$	\$11,250	\$11,250	\$11,250
A6	Avoided FTE for data center management	$A1/250$	0.60	0.60	0.60
A7	Average fully burdened data center FTE salary		\$78,000	\$78,000	\$78,000
A8	Avoided FTE costs	$A6*A7$	\$46,800	\$46,800	\$46,800
At	Eliminated on-premises archive storage spending	$A3+A4+A5+A8$	\$73,050	\$73,350	\$73,656
	Risk adjustment	↓5%			
Atr	Eliminated on-premises archive storage spending (risk-adjusted)		\$69,398	\$69,683	\$69,973

Cloud Storage Savings in Archive Tier

Prior to adopting Azure Archive, the composite organization had already migrated their active data to Hot Tier. With the release of Archive, the organization identified data in Hot Tier which did not require frequent access and relocated it to Archive Tier. By moving dormant data to a lower storage tier, the organization recognized additional monthly per GB cost savings. On a monthly basis, the organization lowered their per GB expenses by 95%. Upon establishing tiering priorities for existing data sets, the organization automatically tiered newly created data to Archive.

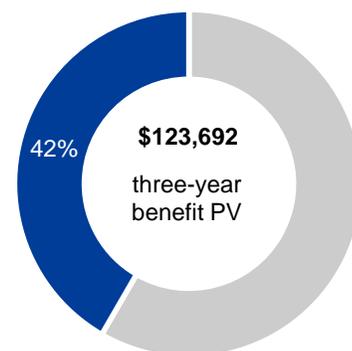
For the composite organization, Forrester assumes that:

- › As scope of services and products grows, more data is produced. This leads to a 25% annual growth in data residing in Archive Tier which would otherwise be stored in Hot Tier.
- › The composite organization uses locally redundant storage in the US West 2 region.

The cloud storage savings will vary with:

- › Size and scope of operations directly impacting creation of unstructured data.

To account for these risks, Forrester adjusted this benefit downward by



Cloud storage savings in Archive Tier: **42%** of total benefits

5%, yielding a projected three-year risk-adjusted total PV of \$116,587.

Cloud Storage Savings In Archive Tier: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3
B1	Data moved from Hot to Archive (TB)	Growing at 25% YOY	200	250	313
B2	Price per gigabyte monthly in Hot tier		\$0.0184	\$0.0184	\$0.0184
B3	Price per gigabyte monthly in Archive		\$0.00099	\$0.00099	\$0.00099
B4	Monthly savings per gigabyte	B2-B3	\$0.0174	\$0.0174	\$0.0174
Bt	Cloud storage savings in Archive Tier	$(B1 * 1,000) * B4 * 12$	\$41,784	\$52,230	\$65,288
	Risk adjustment	↓5%			
Btr	Cloud storage savings in Archive Tier (risk-adjusted)		\$39,695	\$49,619	\$62,023

Unquantified Benefits

Interviewees also identified a variety of benefits achieved with Azure Archive Storage that could not be quantified in this study.

- › **Interviewees met legal or internal compliance mandates.** Interviewees retained archive data to fulfil legal and business compliance obligations. A higher education interviewee storing research data explained: “This particular grant has requirements for researchers to hold on to the data for years. So, that is where we are leveraging [Azure Archive] as you have the benefit in the long term. I know, in general, the way our systems are set up, we are now capable of hosting FERPA and HIPAA information and if need be, unless there is this specific requirement that the information must remain on a system onsite, we wouldn’t have any hesitation to host that kind of data in our databases that we use in Azure.”
- › **Interviewees improved response times to disaster-recovery events.** Organizations were capable of scripting data recovery, rather than manually finding tapes and monitoring data restoration. An interviewee in higher education said: “The ability to get [data] back is much easier. There is a little bit of time investment in writing the script to getting the data back, but once you write the script you can use it for anything. That’s the beauty of scripting versus finding a tape.”
- › **Eliminated costs related to maintaining off-site disaster recovery center.** Organizations that maintained off-site backup centers were able to reduce their footprints and eliminate annual travel expenses related to maintaining those sites. In moving to the cloud, organizations were able to house data at remote locations without maintaining a physical site allowing them to secure their data while eliminating capital investments. A site reliability engineer said, “Since we can put the stuff anywhere on the planet, we don’t have to worry about things going down. This kind of saves us from that, and we always have the data somewhere safe. We have eliminated all but two systems we managed in our DR site now that we can rely on the cloud.”

“The ability to get [data] back is much easier. There is a little bit of the time investment to writing the script to get data back, but once you write the script you can use it for anything. That’s the beauty of scripting versus finding a tape.”

Windows group manager, Higher education



“Since we can put the stuff anywhere on the planet, we don’t have to worry about things going down. This kind of saves us from that, and we always have the data somewhere safe. We have eliminated all but two systems we managed in our DR site now that we can rely on the cloud.”

Site reliability engineer, higher education



Flexibility

The value of flexibility is clearly unique to each customer, and the measure of its value varies from organization to organization. There are multiple scenarios in which a customer might choose to implement Azure Archive Storage and later realize additional uses and business opportunities, including:

- › **Freedom to pursue projects with cutting-edge media files and cloud-native data.** With the availability of Archive Tier pricing, organizations no longer feared creating and retaining information. Organizations could also experiment with the latest media, like 4K video, without worrying about incurring substantial organizational costs.
- › **The ability to save seemingly worthless data for future revenue-generating endeavors.** With Archive Tier, organizations could cost effectively save data which had no current organizational use. This data could be secured at little cost until organizational analytics capabilities matured and a monetization strategy was developed.

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

Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could be turned into business benefit for a future additional investment. This provides an organization with the "right" or the ability to engage in future initiatives but not the obligation to do so.

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
Ctr	Fees for data transfer	\$619	\$550	\$138	\$173	\$1,480	\$1,363
Dtr	Cost of storage	\$0	\$4,158	\$4,752	\$5,495	\$14,405	\$11,835
Etr	Cost of retrieval and reading	\$2,284	\$2,664	\$1,827	\$705	\$7,480	\$6,745
Ftr	Personnel costs for data migration	\$32,175	\$0	\$0	\$0	\$32,175	\$32,175
Gtr	Ongoing personnel costs for storage management	\$0	\$35,490	\$35,490	\$35,490	\$106,470	\$88,258
Total costs (risk-adjusted)		\$35,078	\$47,104	\$47,055	\$47,468	\$176,704	\$152,451

Fees For Data Transfer

The composite organization initially migrated 150 TB from on-premises tape and hard disk to Hot Tier, before writing it to Archive. To achieve this, the organization used the Set Blob Tier operation which immediately changes the tier of objects stored on Azure. Each object stored on Azure requires an individual write operation. Microsoft charges \$0.05 for every 10,000 write operations onto Hot Tier, and \$0.10 per every 10,000 operations of Hot to Archive.

In modeling the data transfer costs of Azure Archive Storage, Forrester assumes:

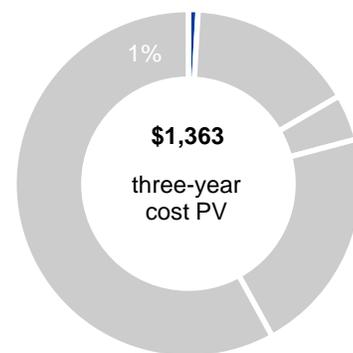
- › An average object size of 4 MB.
- › An initial migration of 150 TB from on-premises storage, with an additional 200 TB from Hot to Archive in Year 1.
- › Annual cloud-native data growth of 25%.

Data transfer costs may vary based on:

- › Size, scope, and location of data transferred to Archive Tier.
- › Average object size of data transferred to Archive Tier.

To account for these risks, Forrester adjusted this cost upward by 5%, yielding a projected three-year risk-adjusted total PV of \$1,363.

The table above shows the total of all costs across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the composite organization expects risk-adjusted total costs to be a PV of \$140,376.



Data transfer fees: 1% of total costs

Implementation risk is the risk that a proposed investment may deviate from the original or expected requirements, resulting in higher costs than anticipated. The greater the uncertainty, the wider the potential range of outcomes for cost estimates.

Fees For Data Transfer: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
C1	Data transferred from on-prem to Hot (TB)	A1	150			
C2	Average object size (MB)	Assumption	4			
C3	Write operations	$(C1 * 1,000,000) / C2$	37,500,000			
C4	Price per 10K write operations (into Hot)		\$0.05			
C5	On-prem to Hot migration cost	$(C3 / 10,000) * C4$	\$187.50			
C6	Data transferred from Hot to Archive (TB)		150	200	50	63
C7	Average object size (MB)	C2	4	4	4	4
C8	Write operations	$(C6 * 1,000,000) / C7$	37,500,000	50,000,000	12,500,000	15,750,000
C9	Price per 10K write operations (Hot to Archive)		\$0.10	\$0.10	\$0.10	\$0.10
C10	Hot to Archive migration cost	$(C8 / 10,000) * C9$	\$375.00	\$500.00	\$125.00	\$157.50
Ct	Fees for data transfer	C5+C10	\$563	\$500	\$125	\$158
	Risk adjustment	↑10%				
Ctr	Fees for data transfer (risk-adjusted)		\$619	\$550	\$138	\$173

Cost Of Storage

The composite organization stored a total of 350 TB of data in Archive Tier in Year 1, growing to 463 TB by Year 3. The organization pays a monthly per GB fee based on region and redundancy level. Microsoft Azure Blob storage is available in 54 regions worldwide, including 140 countries. Microsoft offers four levels of redundancy to meet all object durability needs.

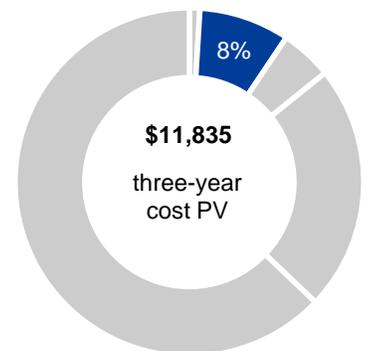
In modeling the storage costs of Azure Archive Storage, Forrester assumes:

- › The composite organization has a locally redundant storage account in US West 2, priced at \$0.00099 per GB per month.

Storage costs may vary based on:

- › Amount of data stored.
- › Region and redundancy level.

Forrester did not adjust for these risks, yielding a projected three-year total PV of \$11,835.



Cost of storage: **8%** of total costs

Cost Of Storage: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
D1	Terabytes of data stored in Archive	A1+B1		350	400	463
D2	Price per gigabyte monthly in Archive			\$0.00099	\$0.00099	\$0.00099
Dt	Cost of storage	$(D1 * 1,000) * D2 * 12$		\$4,158	\$4,752	\$5,495
	Risk adjustment	0%				
Dtr	Cost of storage (risk-adjusted)		\$0	\$4,158	\$4,752	\$5,495

Cost Of Retrieval And Reading

While tiering of objects in Azure is automatic, rehydration can take several hours and requires additional read operations. Furthermore, objects moved to Archive are subject to early deletion penalties if brought back to Hot within 180 days.

Microsoft charges \$0.02 per GB retrieved, and \$5 per 10,000 read operations for objects.

While organizations are primarily archiving data which is not meant to be accessed frequently, it is likely that some data may be erroneously tiered to Archive or required for recovery operations. The composite organization accessed 10% of their archived data during the initial period, although this declined to 1% of data by Year 3. With maturity of use, the organization refined their storage management strategy, establishing policies which greatly reduced their need to recall objects from Archive.

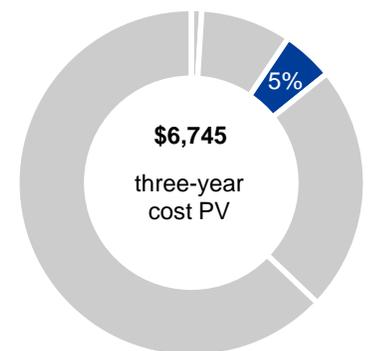
In modeling the costs of retrieval and reading, Forrester assumes:

- › The composite organization will initially need to retrieve 10% of their archived data which will diminish over time with polished storage management policies.
- › Average object size of 4 MB.

Retrieval and reading costs will vary based on:

- › Average size of stored objects.
- › Internal storage management policies, procedures, and oversight.

To account for these risks, Forrester adjusted this cost upward by 5%, yielding a projected three-year risk-adjusted total PV of \$6,745.



Retrieval and reading fees: **5%** of total costs

Cost Of Retrieval And Reading: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
E1	Total data stored in Archive (TB)	A1+B1	150	350	400	463
E2	Percent of data requiring retrieval		10%	5%	3%	1%
E3	Price per GB for retrieval		\$0.02	\$0.02	\$0.02	\$0.02
E4	Cost of retrieval transactions	$(E1 * E2) * 1,000 * E3$	\$300	\$350	\$240	\$93
E5	Average object size (MB)	C2	4	4	4	4
E6	Read operations	$(E1 * E2 * 1,000,000) / E5$	3,750,000	4,375,000	3,000,000	1,157,500
E7	Price per 10K transactions		\$5	\$5	\$5	\$5
E8	Cost of read transactions	$(E6 / 10,000) * E7$	\$1,875.00	\$2,187.50	\$1,500.00	\$578.75
Et	Cost of retrieval and reading	E4+E8	\$2,175	\$2,538	\$1,740	\$671
	Risk adjustment	↑5%				
Etr	Cost of retrieval and reading (risk-adjusted)		\$2,284	\$2,664	\$1,827	\$705

Personnel Costs For Data Migration

The composite organization required nine weeks to fully implement Azure Archive. This nine-week period started with technical planning and scripting, followed by technical implementation and migration. During this period, the organization required two system admins to oversee operations.

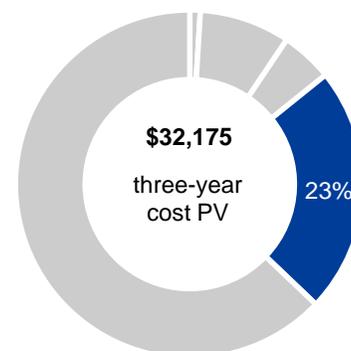
In modeling personnel costs for data migration, Forrester assumes:

- › Fully burdened annual system admin compensation of \$84,500.

Personnel costs for data migration may vary based on:

- › Geography and prevailing labor market rates.
- › Size and scope of data migration project.

To account for these risks, Forrester adjusted this cost upward by 10%, yielding a projected three-year risk-adjusted total PV of \$32,175.



Personnel costs for data migration: **23%** of total costs



Total implementation and deployment time: **nine weeks**

Personnel Costs For Data Migration: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
F1	Systems admins required for migration		2			
F2	Time required for full migration of on-prem (weeks)		9			
F3	Fully burdened system admin comp		\$84,500			
F4	Weekly fully burdened systems admin comp	F3/52	\$1,625			
Ft	Personnel cost for data migration	F1*F2*F4	\$29,250	\$0	\$0	\$0
	Risk adjustment	↑10%				
Ftr	Personnel cost for data migration (risk-adjusted)		\$32,175	\$0	\$0	\$0

Ongoing Personnel Costs For Storage Management

The composite organization requires two system admins to manage their storage operations. The system admins devote 20% of their time to management of archive storage.

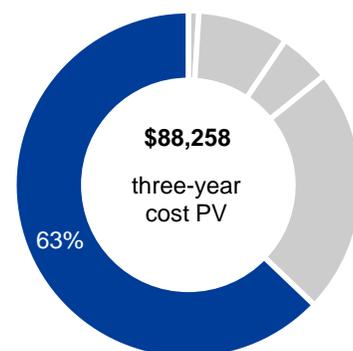
In modeling ongoing management costs, Forrester assumes:

- › Fully burdened annual system admin compensation of \$84,500.

Ongoing management costs may vary based on:

- › Geography and prevailing labor market rates.
- › Size and scope of storage deployment.

To account for these risks, Forrester adjusted this cost upward by 5%, yielding a projected three-year risk-adjusted total PV of \$88,258.



Ongoing personnel costs: **63%** of total costs



Two FTEs spend 20% of their time on ongoing management of Azure Archive Storage.

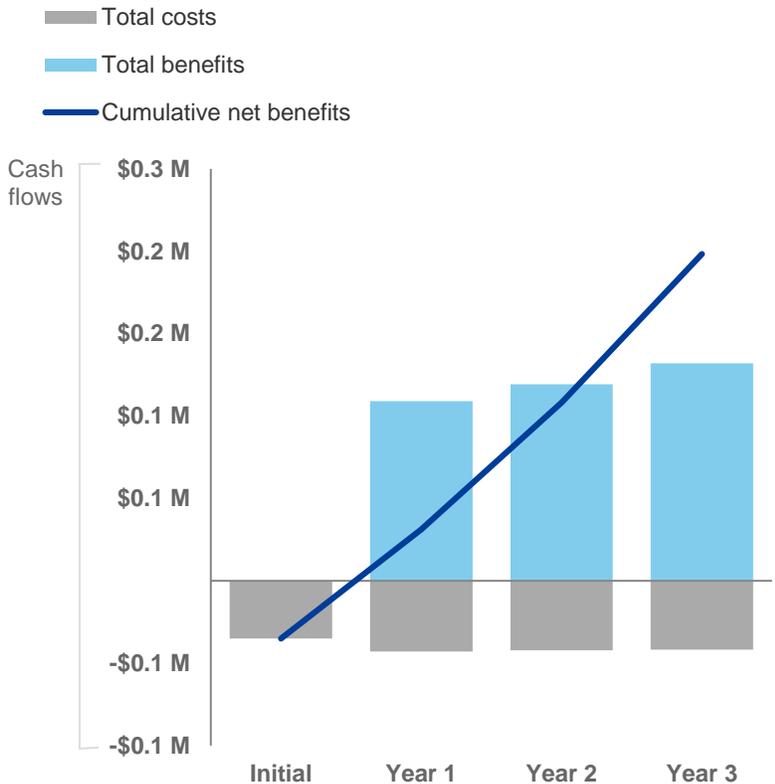
Ongoing Personnel Costs For Storage Management: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
G1	Systems admin managing storage			2	2	2
G2	Fully burdened system admin comp	C4		\$84,500	\$84,500	\$84,500
G3	Time dedicated to managing storage			20%	20%	20%
Gt	Ongoing personnel costs for storage management	$G1 * G2 * G3$		\$33,800	\$33,800	\$33,800
	Risk adjustment	↑5%				
Gtr	Ongoing personnel costs for storage management (risk-adjusted)		\$0	\$35,490	\$35,490	\$35,490

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 Table (Risk-Adjusted)

	INITIAL	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Total costs	(\$35,078)	(\$42,862)	(\$42,207)	(\$41,863)	(\$162,009)	(\$140,376)
Total benefits	\$0	\$109,092	\$119,301	\$131,996	\$360,390	\$296,941
Net benefits	(\$35,078)	\$66,230	\$77,095	\$90,134	\$198,381	\$156,565
ROI						112%
Payback period						7.0 months

Microsoft Azure Archive Storage: Overview

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

Azure Archive Storage is a tier of Azure Blob Storage that offers low-cost, durable, and highly available secure cloud storage for rarely accessed data with flexible latency requirements. Archive storage allows you to store terabytes of data in the cloud for only a few dollars a month and repurpose your storage infrastructure for other critical business objectives.

Archive Storage provides the following benefits:

› **Cost-effectiveness**

Archive Storage is priced at \$0.00099/GB/month

Azure Archive Storage is available in 29 Azure regions, and it is supported by industry-leading independent software vendors (ISVs) like NetApp, Commvault, Cohesity, and Archive360, and it is supported by some of the largest companies in the world.

› **Easier data management and Blob-level tiering**

Azure Archive Storage is a tier (Hot and Cool are the other tiers) of Blob Storage. Hot, Cool, and Archive objects can all exist side by side in the same account. And with the introduction of Blob-level tiering, you can change an object's tier with a single click in the Azure portal, or you can use the REST API (or .NET, Java, Python, and several other software development kits) to programmatically change as many objects as needed. All tiers use consistent APIs allowing customers to seamlessly integrate tiering into their applications.

› **Enterprise grade security that meets the most stringent industry requirements**

Rarely accessed doesn't mean unimportant. Many industries require that organizations maintain multiple years of sensitive financial, medical, or employee data. When you move that data to the cloud, you want it to be protected with the highest level of security. Archive Storage provides secure data transfer to the cloud using HTTPS, and automatically secures that data at rest using 256-bit AES keys.

› **Partner-friendly access**

Many companies have invested in data management relationships with leading ISVs. We've made it easy for data management vendors to take advantage of the Archive tier by working closely with them to ensure their solutions can act as first-class data management citizens.

To learn more about Azure Archive Storage, please visit:
<https://azure.microsoft.com/en-us/services/storage/archive>.

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.