FORRESTER®

The Total Economic Impact™ Of Amazon FSx For NetApp ONTAP

Cost Savings And Business Benefits
Enabled By Amazon FSx For NetApp ONTAP

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Executive Summary

Self-managing storage can be a challenge for organizations, and it can result in an inability to scale, introduce greater outage and security risks, and increase expenditures with vendors, all while reliability and performance suffer. By shifting from a self-managed operating model to a cloud-storage-as-a-service model, organizations optimize costs, storage provisioning and scaling, performance, and availability, without incurring the cost of expensive skill sets.

Amazon FSx for NetApp ONTAP is an Amazon Web Services (AWS) solution that provides fully managed shared storage built on the ONTAP storage operating system. It allows organizations to efficiently migrate workloads to AWS, build applications, modernize data management, and simplify business continuity. FSx for ONTAP combines ONTAP's data access with the availability, security, and scalability of AWS along with integration with other AWS services.

AWS and NetApp commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying FSx for ONTAP.[1] The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of FSx for ONTAP on their organizations.

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed five representatives from four organizations using FSx for ONTAP. For the purposes of this study, Forrester aggregated the interviewees' experiences and combined the results into a single composite

KEY STATISTICS

Return on investment (ROI)
61%

Net present value (NPV)
$1.62M

organization that consumes 350 terabytes of storage in year 1 to 950 terabytes of storage by year 3.

These interviewees noted that prior to using FSx for ONTAP, their organizations used self-managed NetApp solutions alongside other vendor storage solutions. However, the interviewees' organizations incurred large capital expenditures and operational inefficiencies, they had difficulty deploying and scaling storage, and they risked failures and vulnerabilities.

After investing in FSx for ONTAP, the interviewees' organizations realized greater storage consumption and cost efficiencies, which allowed them to grow their storage footprints over time without incurring high up-front costs and low utilization. The organizations shifted their internal resources away from self-managing environments, which allowed them to dedicate their time to strategic tasks. Interviewees reported their organizations increased

Labor efficiency lift by migrating to AWS
45%

migration speeds and accuracy compared to using other cloud storage solutions, which reduced risk.

KEY FINDINGS

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

- **Technology cost savings of 31%.** The composite organization moves its storage to AWS and saves 31% of its total technology costs as compared to its prior, self-managed environment. These savings, which include hardware, procurement, provisioning, licensing, and additional cost savings, are worth a three-year, risk-adjusted $3.2 million to the composite organization.

- **Operational efficiency gains of 45%.** The composite organization realizes a 45% lift in labor efficiency by moving from its legacy environment to an AWS-managed environment, allowing resources to shift their focus to higher-value tasks. The composite organization streamlines and eliminates costs associated with capacity planning, time spent on change management and vendor calls, ongoing provisioning, manual patching, and hardware upgrades, and breaking down siloes that separate teams. The composite realizes a risk-adjusted, three-year total benefit of $660,500 in operational efficiency.

- **Faster migration time to value of 40%.** The composite organization realizes one-time migration savings because FSx for ONTAP allows block replication using NetApp SnapMirror. This saves the composite's FTEs from having to write migration scripts and refactor applications, which reduces the total amount of time required to migrate by nearly five months compared to what the organization would require with other cloud storage solutions. This provides the composite organization with one-time, risk-adjusted savings of $469,500.
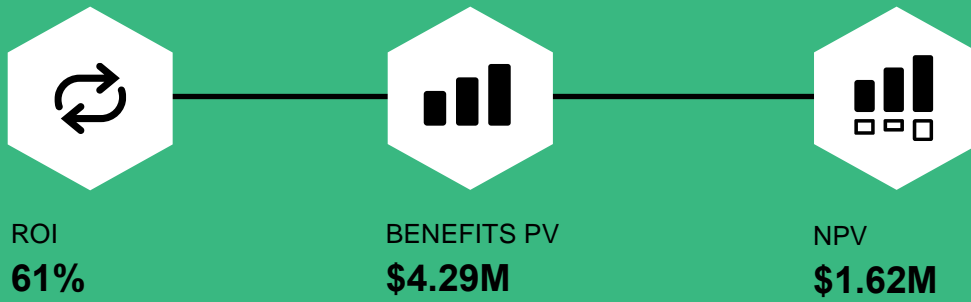
Unquantified benefits. Benefits that provide value for the composite organization but are not quantified in this study include:

- **Ease of training and use due to NetApp familiarity.** The composite saves time on training and other costs due to preexisting familiarity with the ONTAP environment.

- **Improved employee and user experiences.** The composite reduces and eliminates manual tasks, planning sessions, procurement cycles, and outage windows, and this makes it easier for storage and application administrators to do the work they were hired to do. Existing familiarity with ONTAP also drives ease of use for users.

- **Reduced risk with multi-availability zones (multi-AZ) disaster recovery and backup.** AWS' native backup and disaster recovery support critical environments and ensure high data resiliency.

- **Reduced migration and operational risk**. AWS enables better performance, less manual effort, and a more reliable environment. This lowers the risk for day-to-day operations and large, one-off migration projects.

- **Improved security posture.** AWS and NetApp's native security features lower risk, improve uptime, and provide robust security for the composite organization.

- **Improved vendor ecosystem and easier integrations.** FSx for ONTAP accommodates preexisting application integrations, which simplifies the composite organization's technology infrastructure and billing.

- **Seamless hybrid storage infrastructure.** On-premises NetApp data can still function and work well with FSx for ONTAP, meaning that the composite organization can choose whether its data lives in the cloud or on-premises without having to worry about compatibility.

Costs. Three-year, risk-adjusted PV costs for the composite organization include:

- **Licensing costs.** The composite organization is billed based on gigabytes of data consumed in AWS which is divided by the percentage of solid state drives (SSDs), capacity pool, and backup storage consumed. For the composite organization, these total a risk-adjusted, three-year cost of $2.7 million.

The representative interviews and financial analysis found that a composite organization experiences benefits of $4.29 million over three years versus costs of $2.7 million, adding up to a net present value (NPV) of $1.62 million and an ROI of 61%.

ROI
61%

BENEFITS PV
$4.29M

NPV
$1.62M

Benefits (Three-Year)

Technology cost savings — $3.2M

Operational efficiency — $660.5K

Migration time to value — $469.5K
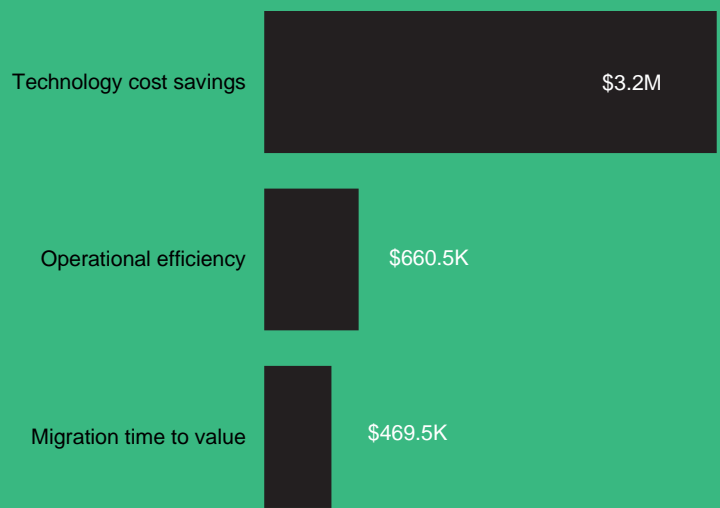
"Not only are we obtaining improved storage costs, but we are also saving time and resources to manage our environment. We also maintain equal or better performance, higher availability, and better disaster recovery."

— Chief technology officer, healthcare

TEI FRAMEWORK AND METHODOLOGY

From the information provided in the interviews, Forrester constructed a Total Economic Impact™ framework for those organizations considering an investment in FSx for ONTAP.

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 FSx for ONTAP can have on an organization.

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by Amazon Web Services 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 Amazon FSx for NetApp ONTAP.

AWS 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.

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

DUE DILIGENCE
Interviewed AWS stakeholders and Forrester analysts to gather data relative to FSx for ONTAP.

INTERVIEWS
Interviewed five representatives at four organizations using FSx for ONTAP to obtain data with respect to costs, benefits, and risks.

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

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

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.

■ Drivers leading to the FSx for ONTAP investment

Interviews				
Role	**Industry**	**Annual revenue**	**Region**	**Storage consumed in Amazon FSx for NetApp ONTAP**
Chief technology officer	Healthcare	$15B+	Australia	1.6 PB
IT director	Energy	$100B+	US	500 TB
• Director of cloud infrastructure services • Storage administrator lead	Media	$4B+	UK headquarters, global operations	400 GB
Chief technology leader	Technology	$50B+	US headquarters, global operations	N/A

KEY CHALLENGES

Before implementing Amazon FSx for NetApp ONTAP, the interviewees' organizations self-managed their storage environments using NetApp solutions and other vendors, both on-premises and in the cloud. This led them to incur greater storage infrastructure costs and other data center fees. The interviewees noted how their organizations struggled with common challenges, including:

- **Capital-intensive expenditures for procurement, installation, and maintenance.** Self-managing storage incurred large fees for the interviewees' organizations in hardware procurement, refresh cycles, maintenance, and management. The chief technology officer for a healthcare organization told Forrester: "We tended to buy hardware [in] a five-year cycle with a five-year support and maintenance [cycle]." He stated that procurement and implementation were difficult on-premises and took, "eight weeks to procure and implement new hardware through existing partner contracts, longer if we had to establish new agreements."

- **Myriad operational inefficiencies from self-managed storage.** The organizations' prior environments introduced operational efficiencies

> **"As we're moving to cloud, we're looking to adopt PAAS (platform-as-a-service) wherever possible."**
>
> *Chief technology officer, healthcare*

and greater toil for their storage teams, particularly across hardware planning and procurement, maintenance, addressing planned and unplanned outages, and additional administrative work.

The IT director at an energy organization told Forrester: "It takes 3 to 4 hours to patch each device, which requires our team to take down the services and create an outage window. Our users want us to do those [things] on weekends and after hours. During those weekends, our team is doing administrative work for each one of those devices by putting out a change, coordinating with users to find outage windows, and

requesting approvals. It's a lot of administrative work."

- **Inability to scale to meet growing business demands.** Interviewees said their organizations struggled to scale their legacy on-premises environments to keep up with cloud modernization goals and growing business demands. The director of cloud infrastructure services for a media organization described one such impediment to scaling their firm's business-critical application with how the company previously maintained its storage environment. They said: "Instead of having shared storage access [of] let's say 10 nodes for a primary application server, we had to create 10 individual copies of the same data using self-managed storage instead. … Every time we had to make a change, we had to do it 10 times instead of once."

- **Risk of vulnerabilities, outages, and failures.** Interviewees told Forrester that self-managing storage environments inevitably led to vulnerabilities, incidents, patching efforts, and increased risk for their organizations.

  - The chief technology leader for a technology organization explained, "Our prior solution's management console didn't actually show us results [to help with data management and security]."

  - The director of cloud infrastructure services for a media organization said: "[Our legacy solution incurred] 10 times the cost, but the biggest pain point was operational. Instead of pushing it out once using CI (continuous integration)/CD (continuous deployment) pipelines, our application developers had to push it out 10 times. … As a result, they would sometimes have failures and [would have] to repush it again. It was a huge step

backward to push out 10 times and getting failures 10% [to] 20% of the time."

  - The IT director at the energy organization said unplanned outages cost hundreds of thousands of dollars. He said: "AWS manages patches, upgrades, and all that for us. We have had a hard time coordinating with application owners to take outages and do the patching. We did not do it, and [we] fell behind in service packs across the enterprise. … It's safe to say there are several hundred thousand dollars of additional impacts from the original outage that had occurred."

"FSx for ONTAP provides that same ease and comfort that you have with [NetApp]."

IT director, energy

WHY AMAZON FSX FOR NETAPP ONTAP?

The interviewees said their organizations chose Amazon FSx for NetApp ONTAP to achieve the following results:

- **Shift from a self-managed model to a storage-as-a-service model.** The chief technology officer at the healthcare organization told Forrester: "We are going to [a] cloud-first [model], like most other organizations, to enable us to get better agility, get greater scale, and move to more of a consistent opex model rather than this heavy capex [model] every five [to] six years. …   [The] ONTAP solution had similar or better performance than our on-premises solution, whereas a lot of the other cloud native storage

solutions, they have different tiering and as you go to the higher tiers for performance, then you pay a premium. FSx for ONTAP already has those higher performance characteristics at that lower price point."

- **Improve agility, scalability, and performance by moving to cloud-first infrastructure.** Interviewees shared the goal of improving their organizations' business velocities by moving to FSx for ONTAP. The chief technology leader in the technology industry described their organization's main business objectives: "Our goals going forward [are] about what you can do from a scalability perspective and from solving strategic business problems. [FSx for ONTAP] provides faster access to storage and helps us be more competitive while lowering costs over time."

- **Streamline operations and ease of administration while leveraging existing skill sets.** The director of cloud infrastructure services at a media organization said: "FSx for ONTAP took the best of both worlds. We wanted a solution that was native AWS and [required] a low effort for maintenance. We don't want to have to hire a bunch of people that are ultra-familiar and in the weeds with ONTAP and all the maintenance, updates, and everything around it. We also don't want to spend an arm and a leg on network costs."

- **Improve disaster-recovery capabilities for business-critical applications.** Interviewees said their organizations chose AWS in part due to its disaster-recovery capabilities that reduced business risk across use cases.

- **Increase migration speed and accuracy while reducing risk.** The chief technology officer at a healthcare organization stated: "We picked [AWS] because we wanted to use the replication between the on-prem side and the cloud environment that allowed us to replicate at a

block level. Because there were about 1.6 petabytes to be migrated, that took a significant amount of time to replicate."

- **Naturally fit with and merge with existing tech stacks and integrations.** Interviewees said FSx for ONTAP supported existing environments, applications, and skill sets.

COMPOSITE ORGANIZATION

Based on the interviews, Forrester constructed a TEI framework, a composite company, and an ROI analysis that illustrates the areas financially affected. The composite organization is representative of the five interviewees and is used to present the aggregate financial analysis in the next section. The composite organization has the following characteristics:

Description of composite. Before investing in Amazon FSx for NetApp ONTAP, the global, enterprise-level composite organization uses NetApp on-premises alongside other vendor technology for storage management. The composite migrates 1 petabyte of self-managed storage in its legacy environment to AWS. In FSx for ONTAP, the composite consumes 350 terabytes of storage in year 1 and 950 terabytes of storage by year 3.

Deployment characteristics. The organization runs Amazon FSx for NetApp ONTAP for business application storage.

Key Assumptions
- **Global, enterprise-level organization**
- **Consumes approximately 1 PB of storage by year 3**

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	Technology cost savings	$705,841	$1,310,847	$1,915,853	$3,932,540	$3,164,426
Btr	Operational efficiency	$265,585	$265,585	$265,585	$796,755	$660,470
Ctr	Migration time to value	$516,415	$0	$0	$516,415	$469,468
	Total benefits (risk-adjusted)	$1,487,841	$1,576,432	$2,181,438	$5,245,710	$4,294,364

TECHNOLOGY COST SAVINGS

Evidence and data. Interviewees' organizations realized technology hardware, infrastructure, and licensing cost savings when they migrated from self-managed storage to FSx for ONTAP. By switching to AWS, they avoided up-front costs for hardware, servers, data center licensing, and other related costs. Instead of provisioning and paying for multiyear storage up front like the organizations did in their prior environments, they paid for what they used, which allowed them to expand their footprints over time.

Additionally, interviewees' organizations optimized costs and performance with the AWS tiered pricing model that allows customers to select the storage type, input/output operations per second (IOPS), and throughput depending on their business requirements. AWS and NetApp's compression, duplication, and other features drove further efficiencies and cost savings.

- The chief technology leader in the technology industry said their organization saved roughly 25% of its technology costs after its first year using FSx for ONTAP. They said, "We've been doing it for roughly 18 months now, and … [during] the first year, it was cheaper by roughly 25%."

> **"We can provision a new file system in minutes and easily scale our cloud pipelines. We couldn't do that in our on-premises model."**
>
> *Chief technology officer, healthcare*

- The IT director at the energy organization explained how their organization reduced its total storage consumption. He said: "We're able to store more things in the same amount of space. For example, if you're storing the same file in two different locations on your shared drive, NetApp can see that all the same type of data is stored twice. It will save it once and have a pointer in one place to the other behind the scenes, so it doesn't have to [physically] store that same file twice on the storage. … As we migrate some of our on-premises workloads to FSx for ONTAP, we are able to retire the physical equipment on-premises. There are savings of ongoing maintenance support for those hardware devices

that we pay for that can actually be per device. Just a rule of thumb is probably about $5,000 a month."

- The chief technology officer at the healthcare organization told Forrester: "The lion's share of the initial costs are the procurement, provisioning, and establishment of a storage array when you first provision it. After you've done that piece, in an operational sense the costs shift towards provisioning and technology lifecycle management to support application growth."

Avoided additional technology costs

31%

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

- The composite organization incurs AWS fees of $567,168 in Year 1, $1,053,312 in Year 2, and $1,539,456 in Year 3.

- The composite scales its consumption in AWS from 35% of 1PB in Year 1 to 65% and 95% in Years 2 and 3, respectively.

- The cost of hosting equivalent storage on-premises is equal to an additional 31% cost each year.

Risks. Factors that could impact the size of this benefit for organizations include:

- Prior costs of hosting storage on-premises

- Reduction of costs by shifting to AWS.

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 $3.2 million.

Technology Cost Savings					
Ref.	**Metric**	**Source**	**Year 1**	**Year 2**	**Year 3**
A1	Cost of AWS	Interviews	$567,168	$1,053,312	$1,539,456
A2	Additional cost of hosting equivalent storage on premises spread over three years	Interviews	31%	31%	31%
At	Technology cost savings	A1*(1+A2)	$742,990	$1,379,839	$2,016,687
	Risk adjustment	↓5%			
Atr	Technology cost savings (risk-adjusted)		$705,841	$1,310,847	$1,915,853
	Three-year total: $3,932,540			**Three-year present value: $3,164,426**	

OPERATIONAL EFFICIENCY

Evidence and data. Interviewees' organizations improved operational efficiency after investing in Amazon FSx for NetApp ONTAP. The organizations reduced or eliminated procurement and provisioning efforts, ongoing maintenance, patching efforts, and management of redundant systems. This allowed administrators to refocus their time to other strategic tasks while also increasing business velocity and application and service time to value.

The chief technology leader in the technology industry explained how FSx for ONTAP provided their organization with further cost savings by allowing employees to use their newly freed-up time on other endeavors. The leader said: "We've seen typically a 30% reduction in labor improvement in how much time [employees] get back. It's about how much time they can devote to the other activities, learnings, and high-value situations that we think are more appropriate for them."

Operational efficiency lift with Amazon FSx for NetApp ONTAP

45%

Interviewees shared the following drivers for improved operational efficiency:

- **Streamlined storage provisioning and management.** The chief technology officer in the healthcare industry explained that before using AWS, their organization needed to pay for individual racks, teams managing and linking racks, and ongoing application administrators working with storage administrators. The CTO said: "[In our legacy on-premises environment],

there [was] a whole interaction between the application or host administrators with the storage people to allocate storage. … With [the] NetApp ONTAP offering, all that is taken care of, and the host administrator calls an API to allocate."

- The same interviewee shared: "We can manage their multiple file systems using one management console — one AWS command-line interface across the board … that helps us achieve more efficiency, which translates into lower costs."

- The IT director in the energy industry described how AWS's time-savings helped their organization make steady progress toward leaving a data center. He said: "The other savings is that my team doesn't have to physically go over to the data center to configure disk drives, power supplies, or hardware. We save on support of that physical hardware. … It's probably about $7,000 a month in maintenance support. … It's worth it to have our people freed from these administrative day-to-day environment support tasks. … It's supporting our cloud-first direction. … It's in support of us trying to get out of the data center."

- **Reduced patching efforts.** The storage administrator lead in the media industry said their organization saved hours of configuration, deployment, and patching time. They said: "[FSx for ONTAP] really reduced the time of configuration deployment and bringing the app back online. For example, it might take a patching system where you had 10 people 12 hours. Whereas, right now, you might bring it down to 3 or 4 hours."

  - The IT director in the energy industry stated that their organization found significant savings in patching its

environments since moving to AWS. He said: "They'll manage patches, upgrades, and all that for us. … We had a hard time getting outage windows. … With AWS management, we can indicate to app owners, 'Here's what's going to happen.'"

- The chief technology officer at the healthcare organization said: "We don't have to worry about any product patching, operating-system patching, or any of that. We also don't have to manage the contract for the managed services."

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

- The composite organization previously required four FTEs to manage its legacy environment.

- The composite experiences a 45% labor efficiency lift in savings on patching, configuration, and management of redundant instances.

- The composite needs 2.2 FTEs to manage its new environment.

- The fully burdened annual salary of a storage systems engineer is $163,941.

Risks. Factors that could impact the size of this benefit for organizations include:

- Number of employees required to manage storage prior to AWS.

- Size of labor efficiency improvement.

- Fully burdened storage FTE salary.

> **"The capabilities [of FSx for ONTAP] lead to the time savings and agility we get. It's essentially the capability improvement and speed of execution."**
>
> *Director of cloud infrastructure services, media*

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of $660,500.

Operational Efficiency

Ref.	Metric	Source	Year 1	Year 2	Year 3
B1	Number of FTEs required in legacy environment	Composite	4.0	4.0	4.0
B2	Labor efficiency lift by migrating to AWS	Interviews	45%	45%	45%
B3	Number of FTEs required with AWS	B1-(B1*B2)	2.2	2.2	2.2
B4	Storage systems engineer fully burdened annual salary	TEI standard	$163,941	$163,941	$163,941
Bt	Operational efficiency	(B1-B3)*B4	$295,094	$295,094	$295,094
	Risk adjustment	↓10%			
Btr	Operational efficiency (risk-adjusted)		$265,585	$265,585	$265,585
	Three-year total: $796,755		**Three-year present value: $660,470**		

MIGRATION TIME TO VALUE

Evidence and data. Interviewees told Forrester that investing in FSx for ONTAP expedited their organizations' migration speeds, efficiency, and accuracy away from on-premises data centers and other legacy environments as compared to moving to other cloud solutions. This reduced business risk and increased migration success, which was particularly urgent in high-priority environments.

The chief technology officer at the healthcare organization said: "We didn't have to refactor the storage using this solution. We didn't have to back up, restore, redeploy, set up a whole new storage farm, test it, build it, do all the performance testing, and so on because NetApp was already a known solution. It allowed us literally to replicate and turn it on."

As a result, the organization reduced the number of FTEs required for migration by 50%. The director stated: "We would have had about probably five to six people in the migration team as opposed to the three [who] manage it. … And I'm not sure if we would have gotten the same performance and ease of availability."

"AWS helped de-risk our migration projects by using FSx for ONTAP features, the initial migration and ongoing data synchronization was pretty much automatic."

Chief technology officer, healthcare

- In addition, the same interviewee said their organization's migration project length would double without FSx for ONTAP. He said: "If we had to refactor it ourselves, we would have had to put more FTEs against it. … We wouldn't have replicated things up there as quickly. … It might have doubled our time [to migrate]."

- The same interviewee provided an example. He said: "We have a direct connection between our data center and AWS. It allows us to block replicate using the NetApp SnapMirror, which allows [us] to do a block-based replication at the

lower storage level without having to write a whole bunch of migration scripts."

Reduction in migration time

40%

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

- The composite organization undergoes one migration of 1PB of data.

- Each migration without AWS requires five FTEs AWS.

- Each migration without AWS requires 12 months AWS.

- Migrating to FSx for ONTAP requires 3.5 FTEs and saves 4.8 months.

Risks. The following factors can impact the size of this benefit for organizations:

- Time required to migrate before using AWS and after AWS.

- Number and type of FTEs required for migrations before using AWS and after AWS.

- Size of environment and number of migrations required.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of $469,500.

Migration Time To Value					
Ref.	Metric	Source	Year 1	Year 2	Year 3
C1	Number of migrations	Composite	1.0	0	0
C2	Headcount required per migration onto non-FSx for ONTAP cloud solution	Composite	5.0	0	0
C3	Migration length without AWS (months)	Interviews	12.0	0	0
C4	Subtotal: Total FTEs required to migrate without AWS	C1*C2*(C3/12)	5.0	0	0
C5	Headcount avoided per migration with AWS	C2*50%	2.5	0	0
C6	Migration time avoided with AWS	C3*40%	4.8	0	0
C7	Subtotal: Total FTEs required per migration with AWS	(C2-C5)*((C3-C6)/12)	1.5	0	0
C8	Avoided FTEs per migration	C4-C7	3.5	0	0
Ct	Migration time to value	C8*B4	$573,795	$0	$0
	Risk adjustment	↓10%			
Ctr	Migration time to value (risk-adjusted)		$516,415	$0	$0
	Three-year total: $516,415			**Three-year present value: $469,468**	

UNQUANTIFIED BENEFITS

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

- **Ease of training and use due to ONTAP familiarity.** Interviewees' organizations saved on training time and costs due to familiarity with the environment. The organizations also streamlined operations through familiar capabilities used in their prior environments. The director of cloud infrastructure services told Forrester: "It will allow us to essentially replace a lot of those capabilities in NetApp using this technology instead. Our familiarity with the platform helps. For example, we need to replicate to lower environments. We can use the built-in technologies to replicate that to lower environments and create clones of that without using additional storage. [That means] it creates a full additional copy to run some other environments."

  ▪ The IT director at the energy organization stated: "Ramp-up time with AWS was very quick. We are very familiar with NetApp already both in the cloud and on-premises. There's not a whole lot of training."

  ▪ The chief technology officer for the healthcare organization told Forrester, "Teams that have existing experience with NetApp on-prem are easily able to transition to using FSx for ONTAP." This indicates that even new hires with preexisting NetApp familiarity can quickly get up to speed and ready to go with FSx for ONTAP.

- **Improved employee and user experiences.** Eliminating manual tasks, planning sessions, procurement cycles, and outage windows made it easier for storage and application administrators to do the work they were hired to do. Having a familiar environment with the capabilities of prior

NetApp environments drove ease of use for users. The director of cloud infrastructure services for the media organization stated, "Ultimately, the other teams we work with are much happier [now] that [FSx for ONTAP] exists."

- **Improved performance and availability.** While interviewees were only able to quantify the cost savings of their organizations' new storage environments, several believed their organization's new environment yielded better performance. The storage administrator lead for the media organization told Forrester, "We've been 100% available except for scheduled maintenance on other pieces, but not for FSx for ONTAP."

- **Reduced risk with multi-AZ disaster recovery and backup.** The chief technology officer at a healthcare organization shared: "AWS has native failover capabilities in near-real time across availability zones within AWS, which basically allows us to do disaster recovery or high availability a lot cleaner. It's one of those environments where if you've got a very critical environment that needs high performance, but you want to keep your cost basis down, it's a target point for storage."

  The chief technology leader at a technology organization told Forrester: "[FSx for ONTAP] is excellent for backup and recovery, especially since storage is a critical part of our overall architecture, how this impacts a chief technology leader, and how it impacts our clients. It ties into the overall process of resiliency [on] the data side."

- **Reduced migration and operational risk.** Interviewees said AWS enabled better performance, less manual effort, and a more reliable environment. This lowered the risk for day-to-day operations and large, one-off migration projects.

- **Improved security posture.** The chief technology leader at the technology organization praised AWS and NetApp's embedded security features. They said: "We're always concerned about security. AWS is as secure as any public cloud out there. Our biggest concern is encryption due to the increased sophistication of hackers breaking through encryption. … But because ONTAP supports strong encryption type languages, that's a big benefit."

- **Seamless hybrid storage infrastructure.** On-premises NetApp data can still function and work well with FSx for ONTAP, meaning that organizations can choose whether data lives in the cloud or on-premises without having to worry about compatibility.

> **"As far as the speed of migration, it's so much faster to be able to do what we're talking about compared to on-prem."**
>
> *Chief technology leader, technology*

FLEXIBILITY

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

- **Improved vendor ecosystem, easier integrations, and simplified billing management.** Having access to the AWS and NetApp ecosystems made it easier for the interviewees' organizations to consider and integrate other products as needed. The chief technology officer at the healthcare organization stated: "Our previous on-premises offering was just a stand-alone NetApp offering. In AWS, it's fully integrated with all the compatible AWS offerings. The virtual private cloud (VPC), identity management, key management, and all the components that are there in [AWS] CloudFormation allow us to utilize all the native AWS toolsets around the storage offering."

The IT director at the energy organization said: "We get quicker resolution on issues because we now immediately go to AWS. Being part of the AWS ecosystem means the whole procurement process, licensing, and billing is all one. In the past, we paid monthly for the storage cost [of our legacy storage solution] because it's AWS storage, but then we also paid an annual license cost. We avoid that NetApp component which [is] all managed one stop with AWS."

- **Ease of adoption and future migrations.** The chief technology officer at the healthcare organization said: "We know data gets into [AWS] accurately. It allows migration to happen with the greatest amount of ease [and] without too much manual intervention. We can use the same repeatable patent for any future application with a big storage footprint that we need to migrate."

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

Analysis Of Costs

Quantified cost data as applied to the composite

Total Costs							
Ref.	Cost	Initial	Year 1	Year 2	Year 3	Total	Present Value
Dtr	Licensing costs	$0	$595,526	$1,105,978	$1,616,429	$3,317,933	$2,669,866
	Total costs (risk-adjusted)	$0	$595,526	$1,105,978	$1,616,429	$3,317,933	$2,669,866

LICENSING COSTS

Evidence and data. Interviewees told Forrester that FSx for ONTAP was built into their organizations' overall AWS prices.

Organizations pay primarily based on how much storage they consume in AWS. And organizations pay varying fees depending on SSD storage, capacity pool storage, backup storage, and regions.

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

- The composite starts with 35% of its storage consumed in AWS, and this percentage rises to 65% in Year 2 and to 95% in Year 3.

- The composite has 20% of its storage on SSD and pays $0.25 per gigabyte.

- The composite has 80% of its storage as capacity pool storage, and it pays $0.04 per gigabyte.

- The composite pays for 20% backup storage, and it pays $0.05 per gigabyte.

- The composite's migration labor costs are not calculated for the purposes of this study.

Risks. Factors that could impact the size of this cost for organizations include:

- Total amount and percentage of data consumed in AWS.

- Percentage and cost of storage on AWS that is SSD, capacity pool, or backup storage.

Results. To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of $2.7 million.

Licensing Costs

Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
D1	Total gigabytes consumed with FSx for ONTAP	Composite	$0	350,000	650,000	950,000
D2	SSD storage	D3*20%*$0.25*12 months	$0	$210,000	$390,000	$570,000
D3	Capacity pool storage	D3*80%*$0.04*12 months	$0	$147,168	$273,312	$399,456
D4	Backup storage	D3*20%*$0.05*12 months	$0	$210,000	$390,000	$570,000
Dt	Licensing costs	D4+D5+D6	$0	$567,168	$1,053,312	$1,539,456
	Risk adjustment	↑5%				
Dtr	Licensing costs (risk-adjusted)		$0	$595,526	$1,105,978	$1,616,429
	Three-year total: $3,317,933			**Three-year present value: $2,669,866**		

Financial Summary

CONSOLIDATED THREE-YEAR RISK-ADJUSTED METRICS

Cash Flow Chart (Risk-Adjusted)

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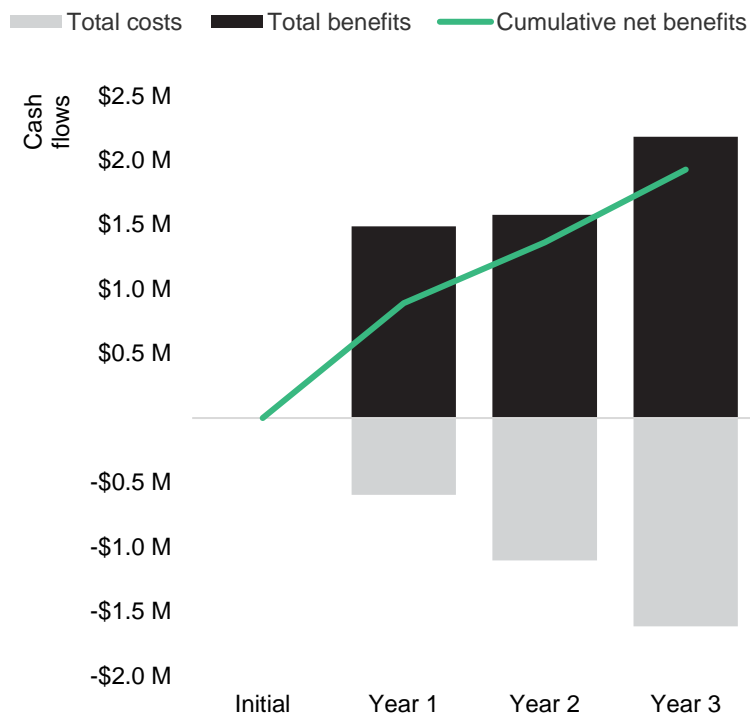
The financial results calculated in the Benefits and Costs sections can be used to determine the ROI, NPV, and payback period for the composite organization's investment. Forrester assumes a yearly discount rate of 10% for this analysis.

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	$0	($595,526)	($1,105,978)	($1,616,429)	($3,317,933)	($2,669,866)
Total benefits	$0	$1,487,841	$1,576,432	$2,181,438	$5,245,710	$4,294,364
Net benefits	$0	$892,314	$470,454	$565,009	$1,927,777	$1,624,498
ROI						61%
Payback						<6 months

Appendix A: Total Economic Impact

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

TOTAL ECONOMIC IMPACT APPROACH

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

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

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

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

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

PRESENT VALUE (PV)

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

NET PRESENT VALUE (NPV)

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

RETURN ON INVESTMENT (ROI)

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

DISCOUNT RATE

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

PAYBACK PERIOD

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

Appendix B: Endnotes

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

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