FORRESTER®

NEW TECH

New Technology: The Projected Total Economic Impact™ Of Dell Technologies APEX Data Storage Services

Cost Savings And Business Benefits Enabled By Storage As A Service

JUNE 2021

A FORRESTER NEW TECHNOLOGY PROJECTED TOTAL ECONOMIC IMPACT™ STUDY COMMISSIONED BY DELL

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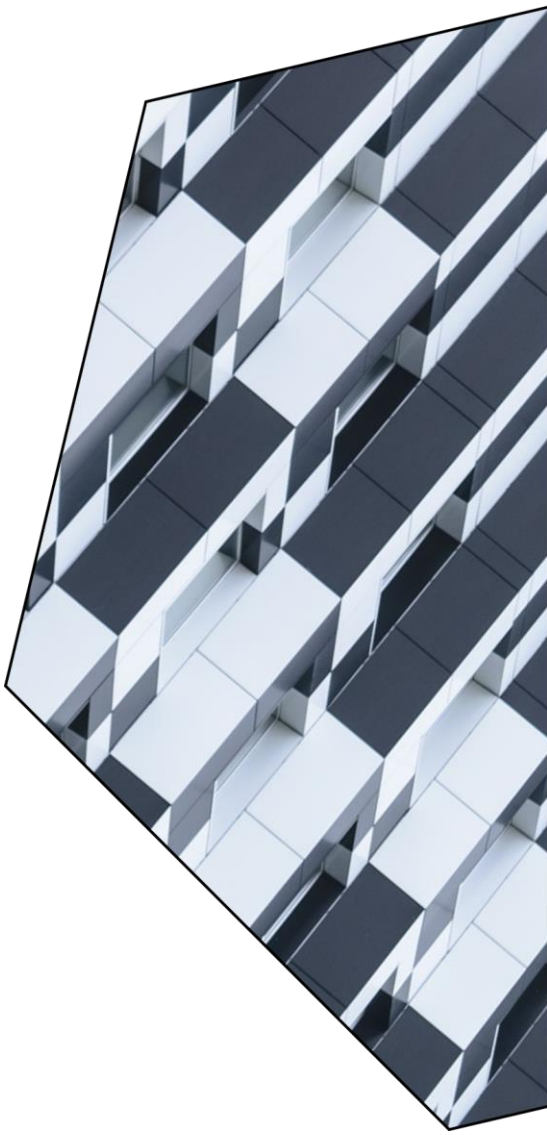


ABOUT FORRESTER CONSULTING

Forrester Consulting provides independent and objective research-based consulting to help leaders succeed in their organizations. For more information, visit forrester.com/consulting.

Executive Summary

APEX Data Storage Services enables customers to avoid many of the costs associated with traditional on-premises storage models. Based on customer interviews and a survey, customers can move storage expenses from capex to opex, save 10% to 20% of time spent managing storage infrastructure, and reduce 63% to 86% of planning and provisioning costs. Furthermore, customers may improve employee productivity and reduce end-of-term costs and public cloud storage costs by unquantified amounts.

Dell Technologies offers APEX Data Storage Services, which delivers block and file data services in an "as-a-service" model. It enables customers to avoid the costs associated with traditional models of on-premises infrastructure, such as periodic tech refresh cycles and the administrative burden of infrastructure management and maintenance. It provides a scalable and elastic option for those interested in moving to an operating expense (opex) model for storage, while maintaining the security and control of infrastructure located on-premises or in a colocation facility.

Dell Technologies commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying APEX Data Storage Services. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of APEX Data Storage Services on their organizations.

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed four customers with experience using APEX Data Storage Services. 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 APEX Data Storage Services, the customers invested heavily in on-premises storage infrastructure, incurring high capital expenditures and high resource costs to maintain and service this infrastructure. Customers typically overprovisioned or overinvested in their storage to avoid any lack of capacity during unforeseen spikes in organizational storage needs. Customers also experienced high costs and long wait times associated with planning and provisioning for additional storage capacity.

KEY STATISTICS

Projected return on investment (ROI)
87% to 129%

Projected net present value (NPV)
$1.3M to $1.9M

By investing in APEX Data Storage Services, customers estimated they would reduce their on-premises infrastructure expenses related to storage infrastructure, while saving time for internal resources tasked with managing this infrastructure. They also projected they will reduce the time and expense associated with planning for and provisioning additional storage capacity.

Net benefit value per TB

$1,298 to $1,929

KEY FINDINGS

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

- **Transitioned storage-related capital expenditures to operating expenditures.** Customers said they were able to transition 100% of their storage-related capex to opex for any amount of storage they moved to APEX Data Storage Services. APEX Data Storage Services also enabled the composite organization to eliminate the costs of overprovisioned storage, which amounts to 20% to 45% of total storage infrastructure.
- **Improved efficiency of storage professionals by between 10% and 20%.** By eliminating much of the work around hardware management and simplifying some software management, customers estimated saving between 10% and 20% of their time managing storage infrastructure by moving to APEX Data Storage Services.
- **Reduced costs of planning and provisioning storage between 63% and 86%.** APEX Data Storage Services sped up the planning and delivery of storage from an average of 6.5 months to between one month and 2.5 months. For the composite organization, this would reduce costs from over $290,000 annually to between $40,950 and $108,225 annually with a hypothetical full deployment on APEX Data Storage Services.

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

- **Improved productivity of employees.** By accelerating the deployment time of storage by between 63% and 86%, APEX Data Storage Services enabled an unquantifiable productivity benefit to a broader employee base in instances in which they were unable to complete work for lack of available storage.

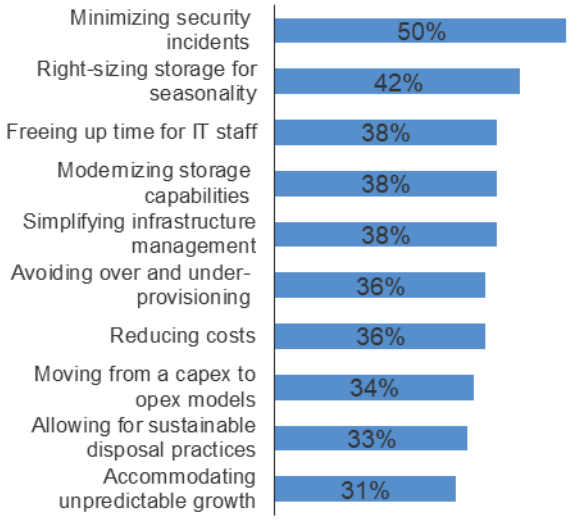
> **“We’re now relieved from the variability of our business and can scale up or down when we need. Dell handles all the work.”**
>
> — Senior cloud solutions architect, telecommunications

- **Additional value shifting capex to opex.** Customers noted there would be additional, unquantifiable financial value derived from classifying storage costs as operating expenses rather than capital expenses, while still maintaining compliance and security standards of on-premises infrastructure.
- **Reduced end-of-term costs.** Customers reported potential savings to end-of-term costs. The regular costs to remove and discard end-of-term storage infrastructure (including costs from policies to manage the safe and sustainable removal of such equipment) were transferred to Dell Technologies after deploying APEX Data Storage Services.
- **Consistently up-to-date hardware.** While storage professionals are tasked with maintaining on-premises infrastructure, they must often shift their attention to other projects that take precedence over updating systems, resulting in less frequently updated hardware than desired. As these responsibilities would shift to Dell Technologies, customers said they expect to receive the benefits of more frequently updated hardware with APEX Data Storage Services.
- **Repatriation of public cloud storage.** Some customers also relayed prospective plans to repatriate public cloud storage to APEX Data Storage Services. If these customers do so, they would reduce their costs of public cloud storage when deploying APEX Data Storage Services.

Costs. Risk-adjusted PV costs include:

- **APEX Data Storage Services fees.** The composite organization moves 1PB of storage to APEX Data Storage Services over three years, using block and file services at various performance tiers and base capacities and paying a total, risk-adjusted net present value (NPV) of $1.5 million over three years.

"How important are the following benefits of the storage-as-a-service offering from Dell Technologies to your organization?" (Showing "Very important")



Base: 121 IT decision-makers responsible for storage
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell, April 2021

- **Internal costs of implementation and ongoing management.** The composite organization requires 27.6 hours from 7 FTEs to plan for a migration of its data to APEX Data Storage Services with no downtime. Twenty person-hours per 100TB are required to deploy and migrate additional capacity. Five FTEs spend 2 hours in training before deployment and an additional FTE is trained each year after that. It requires 100 person-hours annually to manage on an ongoing basis.

For the composite organization, Forrester modeled a range of projected low-impact, medium-impact, and high-impact outcomes based on evaluated risk. This financial analysis projects that the composite accrues the following three-year NPVs for by enabling APEX Data Storage Services:

- Projected high impact of a $1.9-million NPV and projected ROI of 129%.
- Projected medium impact of a $1.6-million NPV and projected ROI of 107%.
- Projected low impact of a $1.3-million NPV and projected ROI of 87%.

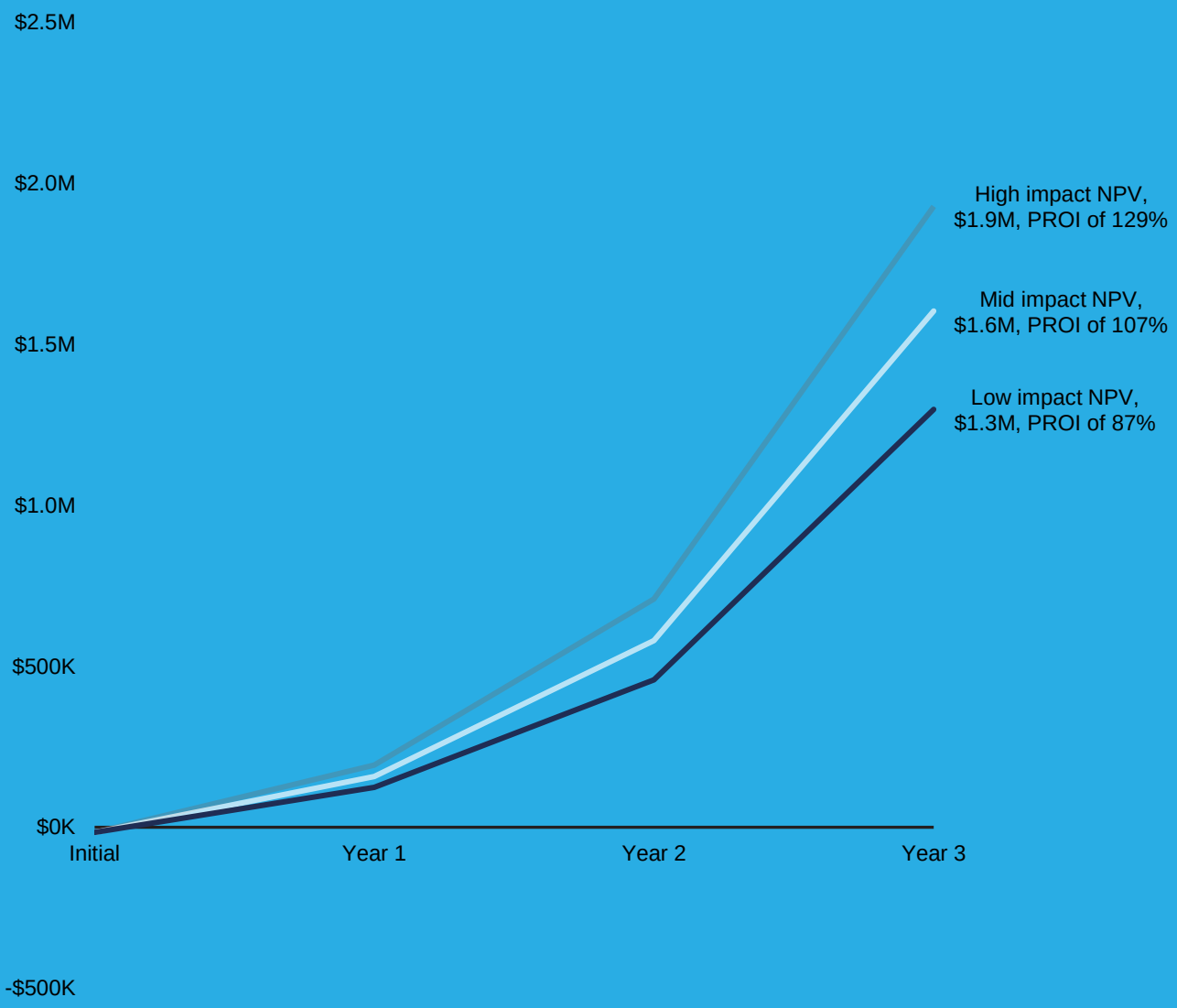
PROI
87% to 129%

PROJECTED BENEFITS PV
$2.8M to $3.4M

PROJECTED NPV
$1.3M to $1.9M

TOTAL COSTS
$1.5 million

Three-Year Projected Financial Analysis For The Composite Organization



NEW TECH TEI FRAMEWORK AND METHODOLOGY

From the information provided in the interviews, Forrester constructed a New Technology: Projected Total Economic Impact™ (New Tech TEI) framework for those organizations considering an investment in APEX Data Storage Services.

The objective of the framework is to identify the potential cost, benefit, flexibility, and risk factors that affect the investment decision. Forrester took a multistep approach to evaluate the projected impact that APEX Data Storage Services can have on an organization.

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by Dell Technologies 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 APEX Data Storage Services.

Dell Technologies 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.

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

DUE DILIGENCE

Interviewed Dell Technologies stakeholders and Forrester analysts to gather data relative to APEX Data Storage Services.

EARLY-IMPLEMENTATION CUSTOMER INTERVIEWS AND SURVEY

Interviewed five IT decision-makers at organizations using APEX Data Storage Services in a pilot or beta stage to obtain data with respect to projected costs, benefits, and risks. Forrester also surveyed an additional 121 IT decision-makers.

COMPOSITE ORGANIZATION

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

PROJECTED FINANCIAL MODEL FRAMEWORK

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

CASE STUDY

Employed four fundamental elements of New Tech TEI in modeling the investment's potential 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 APEX Data Storage Services Customer Journey

Drivers leading to the APEX Data Storage Services investment

KEY CHALLENGES

Before participating in the APEX Data Storage Services private preview (a pilot program), the interviewed customers were each operating and managing their own on-premises storage environments. Some also had public or hybrid-cloud storage environments for targeted use cases. Each customer expects to replace at least a portion of its on-premises storage infrastructure with APEX Data Storage Services, while only some customers expect to eventually repatriate a portion of their public cloud storage to APEX Data Storage Services.

The interviewed organizations struggled with common challenges regarding their storage environments, including:

- **Difficulty forecasting on-premises storage needs.** Customers reported struggling to regularly analyze the currently available capacity of their on-premises storage environments and extrapolate the short-term to medium-term organizational needs for future capacity. The consequences of erroneous forecasting included lost productivity and spikes in planning, procurement, and provisioning costs if underestimated. To avoid underprovisioning storage, customers regularly participated in the practice of overprovisioning storage. This essentially self-insured against spikes in on-premises storage needs and incurring additional upfront capital expenses (capex) for extra storage capacity that is deployed but not initially utilized.

"Our primary challenge is being able to guess right on the complex set of factors that determine these large purchases like data center capacity, network capacity, and future needs. If we come up short, we're scrambling to make it right, and if we go too big, we'll have a lot of stuff that's sitting underutilized and is depreciating."

Product line architect, technology

- **Managing on-premises storage environments while keeping a lean team.** Customers struggled with the high internal costs required to manage and service their on-premises storage environments, with limited budgets for IT resource expansion. Organizations attempting to keep teams lean also grappled with their ability to maintain hardware and software up to date in their on-premises storage environments as there was little available time for upgrades. Customers hoped transitioning to APEX Data Storage Services would augment their staffs and allow IT resources to focus on higher-value work.

"We're a super-lean team, so the whole idea of having storage on the floor that isn't managed by the two people on staff is very attractive as it can augment our existing team."

Director of business computing services, healthcare

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 four 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 composite organization is a B2B firm that generates $6 billion in revenue and employs 12,000 full-time employees. It previously ran its own traditional, on-premises storage infrastructure, but it has recently expanded to utilize some public cloud storage services. Decision-makers are dissatisfied with the current cost of their on-premises storage environments and had questions about maintaining security, compliance, and customer experience with cloud storage deployments. They are looking to APEX Data Storage Services as a solution.

Deployment characteristics. The composite currently has 6PB of total data under management. This does not include duplicated or replicated data. In Year 1, it explores APEX Data Storage Services by moving 200TB of storage from its traditional on-premises environment to the new solution. As the organization sees early benefits from this migration, it expands its use of APEX Data Storage Services to 500TB in Year 2 and 1PB in Year 3, all at a mix of base capacities and performance tiers. The composite organization does not repatriate any of its cloud storage during this time, but decision-makers are exploring the possibility of doing so in the future.

Key assumptions

- **$6 billion in revenues**
- **12,000 FTEs**
- **6PB total data**
- **Data migrated: 200TB in Year 1, 500TB in Year 2, and 1PB in Year 3**

Analysis Of Benefits

Quantified benefit data as applied to the composite

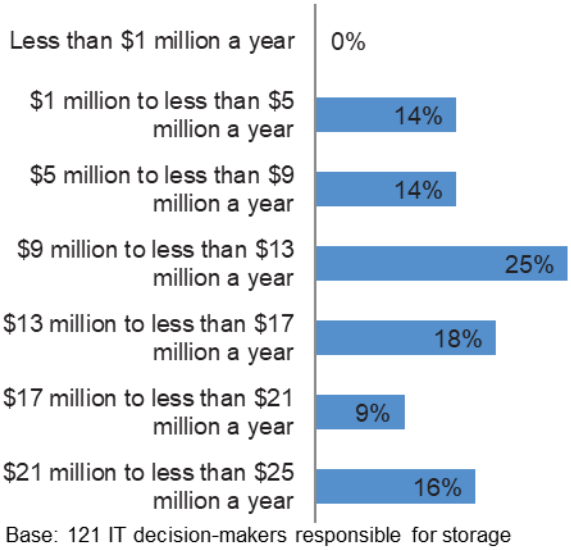
Total Projected Benefits

Projected Benefits	Year 1	Year 2	Year 3	Total	Present Value
Total projected benefits (low)	$337,071	$972,658	$2,245,975	$3,555,704	$2,797,712
Total projected benefits (mid)	$374,029	$1,079,048	$2,491,119	$3,944,196	$3,103,416
Total projected benefits (high)	$413,211	$1,192,050	$2,751,930	$4,357,192	$3,428,378

REDUCED COST OF ON-PREMISES STORAGE INFRASTRUCTURE

Evidence and data. Customers projected that deploying APEX Data Storage Services would reduce the costs of their on-premises storage environments. Interviewed and surveyed customers are each investing in and operating their own traditional, on-premises storage infrastructure. For survey respondents, the total annual costs of this infrastructure (including equipment, labor, and utilities) ranged from a low of between $1 million and $3 million to a high of between $23 million and $25 million. The weighted average of responses amounted to just under $13 million in annual expenses related to on-premises storage.

"What is the total annual cost of ownership for your organization's data storage environment?"



Base: 121 IT decision-makers responsible for storage
Note: Percentages may not total 100 because of rounding.
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell, April 2021

"Right now, if we buy 100TB, we only use 80TB, because we need that buffer for spikes in usage. With APEX Data Services, if we pay for 100TB, we'll be getting 100TB."

Director of business computing services, healthcare

One of the core drivers of high storage costs was the practice of regularly overprovisioning capacity. To mitigate the risk of not having enough storage to meet organizational needs in any given period, storage teams would regularly overinvest in on-premises storage capacity, self-insuring against the fallout from underprovisioning. Customers reported the following rates of regularly unused capacity resulting in sunk costs:

- Healthcare customer: 20%
- Technology customer: 70%
- Telecommunications customer: 50%
- *Average of survey respondents: 37%*

Modeling and assumptions. For the composite organization, Forrester estimates:

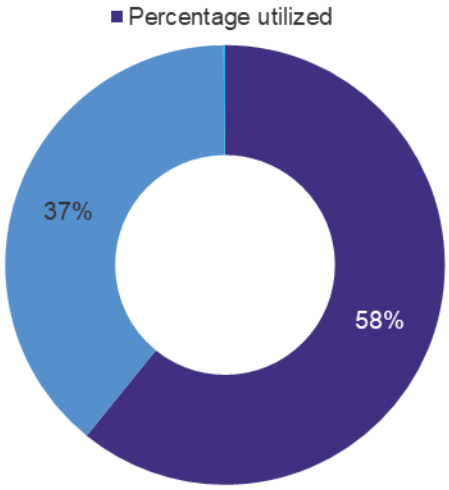
- The annual cost of on-premises storage infrastructure is $8.2 million, and it grows at a rate of 15% annually.
- The percentage of overprovisioned storage is between 20% and 45%.
- The organization moves 200TB of storage to APEX Data Storage Services in Year 1, an additional 300TB in Year 2, and an additional 500TB in Year 3.
- These figures represent 3.3%, 8.3%, and 16.7% of its total storage environment, respectively.

Results. This yields a three-year projected PV (discounted at 10%) ranging from over $2.7 million (low) to over $3.2 million (high).

"When you have a $2-million capex expense for a piece of block storage, it's very hard to charge that back to individual business lines based on consumption. But with APEX Data Storage Services, it's all operational to begin with. We now have a method of tagging storage usage to internal teams in the APEX console. That adds value."

Storage architect, legal

"On average, what percentage of the total available capacity of your storage environment is utilized vs. overprovisioned?"



Base: 111 IT decision-makers responsible for storage
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell, April 2021

Reduced over-provisioning costs

20% to 45%

Reduced Cost Of On-Premises Storage Infrastructure: Calculation Table					
Ref.	**Metric**	**Source**	**Year 1**	**Year 2**	**Year 3**
A1	Annual cost of on-premises storage infrastructure	Survey; 15% annual growth	$8,200,000	$9,430,000	$10,844,500
$A2_{Low}$	Prior storage overprovisioned (percentage)	Survey	20%	20%	20%
$A2_{Mid}$			32%	32%	32%
$A2_{High}$			45%	45%	45%
A3	Storage moved to APEX Data Storage Services (percentage)	Composite	3.3%	8.3%	16.7%
At_{Low}	**Reduced cost of on-premises storage infrastructure**	**(A1*A3)+(A1*A2*A3)**	**$324,720**	**$939,228**	**$2,173,238**
At_{Mid}			**$357,192**	**$1,033,151**	**$2,390,562**
At_{High}			**$392,370**	**$1,134,901**	**$2,625,996**

Reduced Cost Of On-Premises Storage Infrastructure: Summary Table					
Projected Benefits	**Year 1**	**Year 2**	**Year 3**	**Total**	**Present Value**
Reduced cost of on-premises storage infrastructure (Low)	$324,720	$939,228	$2,173,238	$3,437,186	**$2,704,207**
Reduced cost of on-premises storage infrastructure (Mid)	$357,192	$1,033,151	$2,390,562	$3,780,904	**$2,974,628**
Reduced cost of on-premises storage infrastructure (High)	$392,370	$1,134,901	$2,625,996	$4,153,266	**$3,267,584**

IMPROVED EFFICIENCY OF STORAGE PROFESSIONALS

Evidence and data. Customers experienced high internal resource costs associated with managing and servicing their on-premises storage environments. For example, the interviewee from the technology company said their organization currently employs at least 40 professionals who spend between 30% and 40% of their time on lifecycle management and routine engineering activities related to its on-premises storage environment. Customers reported the following estimates related to IT time savings from APEX Data Storage Services:

- Healthcare customer: 50%
- Legal customer: 25%
- Technology customer: 50%

"A big portion of what my team does today is lifecycle management and sustaining engineering. With APEX Data Storage Services, we'll reduce the 30% to 40% of time we spend on updates, code maintenance, and bug fixes, which will now get applied seamlessly in the background."

Product line architect, technology

Time savings to IT

25% to 50%

Customers said they would see additional cost savings in the case of an unexpected outage. Although customers of APEX Data Storage Services are still responsible for managing their own data protection and disaster recovery policies, they would not be responsible for any unexpected hardware or software failures at a site running the service. For example, the interviewee from the legal industry said: "I'm not sure if the likelihood of an outage would decrease, but we would be relieved of the burden of rushing to troubleshoot and diagnose any outage that would happen after migrating to APEX Data Storage Services."

Modeling and assumptions. For the composite organization, Forrester estimates:

- The annual resource costs related to this on-premises storage infrastructure are $3,500,000, and these grow at a rate of 15% annually.
- A conservative time savings to IT of between 10% and 20%, where customers estimated savings between 25% and 50%.

Results. This yields a three-year projected PV (discounted at 10%) ranging from $52,215 (low) to $104,431 (high).

> **"Deploying APEX Data Storage Services would free up our people to focus on adding value to the business, like deploying automation and other higher-order tasks."**
>
> *Product line architect, technology*

Improved Efficiency Of Storage Professionals: Calculation Table

Ref.	Metric	Source	Year 1	Year 2	Year 3
B1	Internal resource cost of managing on-premises storage	Survey	$1,900,000	$2,185,000	$2,512,750
$B2_{Low}$	Resource cost saved from APEX Data Storage Services (percentage)	Interviews	10%	10%	10%
$B2_{Mid}$			15%	15%	15%
$B2_{High}$			20%	20%	20%
B3	Storage moved to APEX Data Storage Services (percentage)	A4	3.3%	8.3%	16.7%
Bt_{Low}	**Improved efficiency of storage professionals**	**B1*B2*B3**	**$6,270**	**$18,136**	**$41,963**
Bt_{Mid}			**$9,405**	**$27,203**	**$62,944**
Bt_{High}			**$12,540**	**$36,271**	**$83,926**

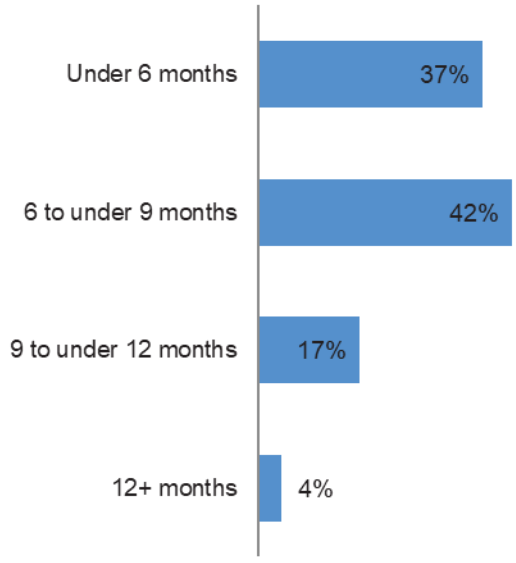
Improved Efficiency Of Storage Professionals: Summary Table

Projected Benefits	Year 1	Year 2	Year 3	Total	Present Value
Improved efficiency of storage professionals (Low)	$6,270	$18,136	$41,963	$66,368	**$52,215**
Improved efficiency of storage professionals (Mid)	$9,405	$27,203	$62,944	$99,553	**$78,323**
Improved efficiency of storage professionals (High)	$12,540	$36,271	$83,926	$132,737	**$104,431**

IMPROVED STORAGE PLANNING AND PROVISIONING PROCESS

Evidence and data. Customers estimated that APEX Data Storage Services would help them to reduce the time costs associated with planning and provisioning storage infrastructure. Survey respondents said the current time it takes to plan for additional storage capacity ranges from less than six months to more than 12 months, with the weighted average being 6.75 months. The number of employees involved in these plans ranged from fewer than 10 to more than 50, with a weighted average of 30. Additionally, customers said wait times from ordering capacity to deployment of the additional storage ranged from less than three months to more than 12 months, with a weighted average of just less than five months.

"How long is the planning process for acquiring additional data storage at your organization?"



Base: 121 IT decision-makers responsible for storage
Note: Percentages may not total 100 because of rounding.
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell, April 2021

Interviewed customers shared the following about the time it takes them to plan for additional capacity:

- Healthcare company: 1.5 weeks
- Legal company: Two to 5 weeks
- Telecom company: Under 4 weeks
- Technology company: Eight weeks

> **"We expect procuring and provisioning work to go away entirely. We would have one negotiation period upfront, and moving forward, if we need storage, we just click a button and move on."**
>
> *Director of business computing services, healthcare*

They shared the below regarding employee involvement in planning:

- Healthcare customer: 10 employees at varying rates of time.
- Technology customer: 20+ employees at between 10% and 20% time.

They also shared the wait times between ordering and deploying new storage in their prior environment:

- Healthcare customer: Eight to 12 weeks.
- Legal customer: Six to 19 weeks.
- Technology customer: 12 to 16 weeks
- Telecommunications customer: Eight weeks.

"When it was demonstrated to us, we saw how easy it would be to order storage. It's basically just a checkbox to get additional capacity."

Storage architect, legal

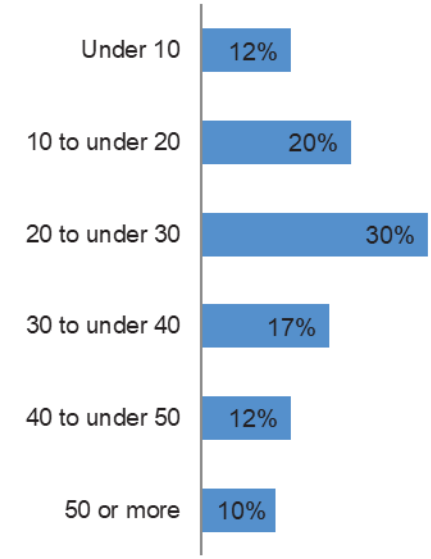
Customers consistently estimated that APEX Data Storage Services reduces the total time associated with planning and provisioning additional storage infrastructure down to between two and four weeks, with the difference dependent on their own internal processes.

Modeling and assumptions. For the composite organization, Forrester estimates:

- The organization completes one planning and provisioning process over 6.5 months each year.
- 30 FTEs are involved in this process at 15% of their time.
- The fully burdened hourly rate of an FTE is $60.

Results. This yields a three-year projected PV (discounted at 10%) ranging from $41,290 (low) to $56,363 (high).

"How many people are involved in the planning process at your organization when it comes to acquiring additional data storage?"



Base: 121 IT decision-makers responsible for storage
Note: Percentages may not total 100 because of rounding.
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Planning/provisioning savings

63% to 86%

Improved Storage Planning And Provisioning Process: Calculation Table

Ref.	Metric	Source	Year 1	Year 2	Year 3
C1	Annual planning and provisioning processes	Survey	1	1	1
C2	Time spent planning and provisioning (months)	Survey	6.5	6.5	6.5
C3	FTEs involved in planning and provisioning process	Survey	30	30	30
C4	FTE time spent on planning and provisioning (percentage)	Interviews	15%	15%	15%
C5	Average fully burdened hourly rate per FTE	Composite	$60	$60	$60
C6	Storage moved to APEX Data Storage Services (percentage)	A4	3.3%	8.3%	16.7%
$C7_{Low}$	Reduction in time from Dell storage-as-a-service	Interviews	63%	63%	63%
$C7_{Mid}$			77%	77%	77%
$C7_{High}$			86%	86%	86%
Ct_{Low}	**Improved storage planning and provisioning process**	**C1*C2*2,000/12* C3*C4*C5*C6*C7**	**$6,081**	**$15,295**	**$30,774**
Ct_{Mid}			**$7,432**	**$18,694**	**$37,613**
Ct_{High}			**$8,301**	**$20,879**	**$42,009**

Improved Storage Planning And Provisioning Process: Summary Table

Projected Benefits	Year 1	Year 2	Year 3	Total	Present Value
Improved storage planning and provisioning process (Low)	$6,081	$15,295	$30,774	$52,150	**$41,290**
Improved storage planning and provisioning process (Mid)	$7,432	$18,694	$37,613	$63,739	**$50,465**
Improved storage planning and provisioning process (High)	$8,301	$20,879	$42,009	$71,189	**$56,363**

UNQUANTIFIED BENEFITS

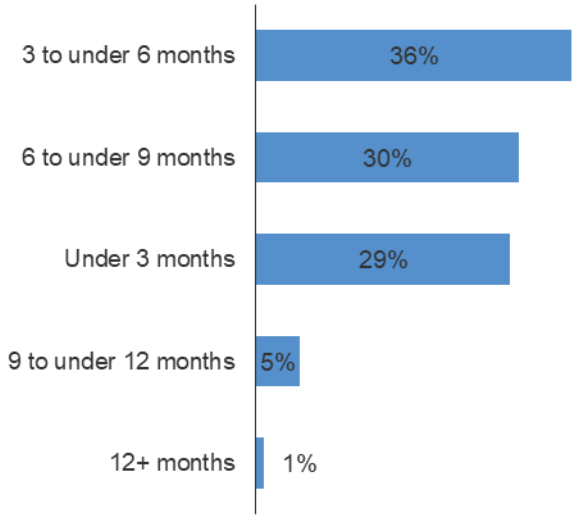
Additional benefits that customers experienced but were not able to quantify include:

- **Improved employee productivity from accelerated storage deployment.** Customers noted that employees were sometimes prevented from completing their work while waiting for the deployment of additional storage capacity. They estimated that APEX Data Storage Services recaptured some of this lost productivity by reducing wait times associated with planning and provisioning storage. The product line architect from the technology company said: "The storage team currently acts as a bottleneck in the system. We currently overspend so we can be less of a bottleneck, but the wait times for additional storage can cause significant upstream delays to employee productivity."

> **"In our prior environment, there were times when new systems were supposed to be implemented, but because we had to wait for additional capacity to be deployed, the project was delayed, and employees' productivity suffered."**
>
> *Storage architect, legal*

- **Additional value from shifting capex to opex.** Customers noted an additional benefit from investing in APEX Data Storage Services would be reclassifying storage costs from on-premises capital expenses to operating expenses, while still maintaining compliance and security standards of on-premises infrastructure. Although they were not able to quantify this value, customers shared that finance teams and executives sought this value as one of the drivers for investment in APEX Data Storage Services.

"What is the wait time from ordering to deployment of additional data storage at your organization?"
(Limited to traditional, on-premises, capex deployments)



Base: 121 IT decision-makers responsible for storage
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell, April 2021

- **Reduced end-of-term costs.** Customers reported but could not estimate the potential for APEX Data Storage Services to reduce any end-of-term costs. Previously, customers went through regular processes to remove and discard end-of-term storage infrastructures. After deploying APEX Data Storage Services, any labor or other costs associated with this (e.g., from policies to manage the safe and sustainable removal of such equipment) would be transferred to Dell Technologies.
- **Consistently up-to-date hardware.** Customers said they expect to be able to take advantage of more up-to-date hardware with APEX Data Storage Services, but they could not estimate the value of this benefit. In their previous environments, storage professionals were tasked with maintaining on-premises infrastructure, but

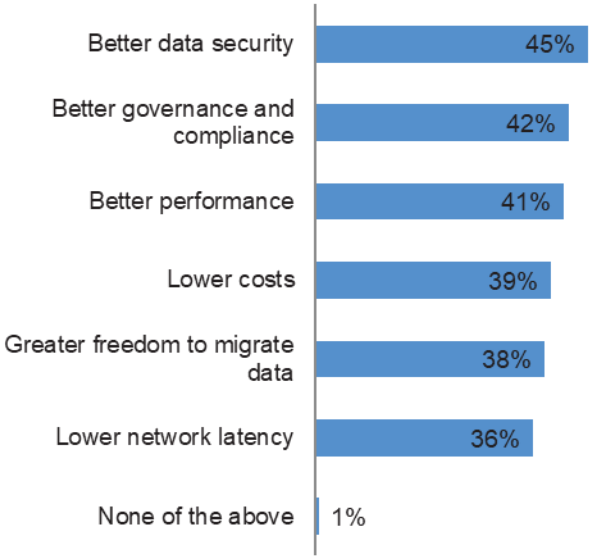
other work often took precedence over updating these systems. As this work would transfer to Dell Technologies, customers expected that such work would be completed sooner than is currently done.

- **Repatriation of public cloud storage.** Lastly, some customers said they might repatriate their cloud storage to APEX Data Storage Services. If these customers went through with repatriation, they would reduce their costs of public cloud storage when deploying APEX Data Storage Services.

"We definitely see a future for repatriating storage currently on the public cloud to APEX Data Storage Services, especially as the product portfolio expands to cover more use cases. We definitely see a synergy there."

Product line architect, technology

"What do you believe are the benefits of on-premises storage-as-a-service vs. public cloud storage?"



Base: 121 IT decision-makers responsible for storage
Note: Percentages may not total 100 because of rounding.
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell, April 2021

FLEXIBILITY

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

- **Improved competitiveness.** Surveyed service providers and other customers that host their clients' data as part of their business model said leveraging APEX Data Storage Services could improve their competitiveness. By outsourcing storage provisioning and maintenance to Dell Technologies, these customers felt they could reduce their cost of hosting, transfer these savings to their customers, and subsequently become more competitive.

"Right now, we have to pass on the costs of storage infrastructure maintenance to our clients based on the amount of infrastructure they require. With APEX Data Storage Services, these costs would reduce for us, and we could pass on those savings to our customers."

Senior cloud solutions architect, telecommunications

- **Reduced risk of underprovisioning.** Customers also noted reducing their risk of underprovisioning with APEX Data Storage Services. When customers found themselves underprovisioned in their prior environments, projects had to be put on hold while additional capacity was ordered, delivered, and deployed. These customers estimate APEX Data Storage Services will reduce this risk, while allowing them to move faster, launching new initiatives with fewer delays.

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

"We found ourselves unexpectedly underprovisioned due to a security incident. As a result, we did have to buy some storage, and we lost time as a result."

Product line architect, technology

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	APEX Data Storage Services fees	$0	$169,512	$548,687	$1,121,422	$1,839,622	$1,450,104
Etr	Internal cost of implementation and ongoing management	$15,869	$13,332	$19,932	$6,732	$55,865	$49,520
	Total costs (risk adjusted)	$15,869	$182,844	$568,619	$1,128,154	$1,895,487	$1,499,624

APEX DATA STORAGE SERVICES FEES

Evidence and data. Dell prices its APEX Data Storage Services block and file services at various rates depending on the service level. Customers set a base capacity that is defined as a commitment amount when they initially order the service. This determines the rate. Committing to a higher base capacity will lead to a lower rate. Any amount of capacity utilized above the base capacity commitment is considered on-demand usage, and it will be billed at the same rate as established by the base capacity. Customers are billed monthly based on their base capacity in addition to any on-demand usage for the month. Dell Technologies offers annual and three-year contracts, with three-year contracts receiving a per-unit discount.

Modeling and assumptions. For the composite organization, Forrester estimates:

- The organization uses APEX Data Storage Services for a total of 200TB in Year 1, 500TB in Year 2, and 1PB in Year 3.
- In Year 1, the organization signs up for a three-year contract for a base capacity of 175TB on block services Capacity Optimized performance tier and averages a use of 200TB.
- In Year 2, it increases its block services Capacity Optimized performance tier to 200TB and averages usage of 250TB. It also signs a three-year contract for file services Balanced performance tier at a base capacity of 200TB and averages usage of 250TB.
- In Year 3, it increases its block services Capacity Optimized performance tier base capacity to 250TB and average usage of 300TB. It signs a three-year contract for block services Balanced performance tier at a base capacity of 300TB and averages usage of 400TB. It increases its base capacity on file services Balanced performance tier to 250TB and averages usage of 300TB.
- The prices utilized are list prices as of June 2021.

Risks. The total APEX Data Storage Services Fees may vary with:

- The choice of block or file services or both, the base capacity/commitment amount contracted, the amount of on-demand capacity usage beyond this base commitment, and the choice of an annual or three-year contract.

Results. As Forrester priced the costs to the composite organization directly with Dell Technologies, this cost has not been adjusted for risk, yielding a three-year, risk-adjusted total PV (discounted at 10%) of $1.5 million.

APEX Data Storage Services Fees						
Ref.	**Metric**	**Source**	**Initial**	**Year 1**	**Year 2**	**Year 3**
D1	Total TB on Dell Storage-as-a-Service	Composite		200	500	1,000
D2	Total TB on block services	Composite		200	250	700
D3	Base capacity on block services Balanced performance tier	Composite		0	0	300
D4	On-demand capacity needed for block services Balanced performance tier	Composite		0	0	100
D5	Base capacity on block services Capacity Optimized performance tier	Composite		175	200	250
D6	On-demand capacity needed for block services Capacity Optimized performance tier	Composite		25	50	50
D7	Subtotal - Dell Storage-as-a-Service Block Services fees	Dell Technologies		$169,512	$211,498	$720,842
D8	Total TB on file services	Composite		0	250	300
D9	Base capacity on file services Balanced performance tier	Composite		0	200	250
D10	On-demand capacity needed for file services Capacity Optimized performance tier	Composite		0	50	50
D11	Subtotal - Dell Storage-as-a-Service File Services fees	Dell Technologies		$0	$337,189	$400,580
Dt	APEX Data Storage Services fees	D7+D11	$0	$169,512	$548,687	$1,121,422
	Risk adjustment	↑0%				
Dtr	APEX Data Storage Services fees (risk-adjusted)		$0	$169,512	$548,687	$1,121,422

INTERNAL COST OF IMPLEMENTATION AND DEPLOYMENT

Evidence and data. Customers said they experienced internal costs associated with the implementation and deployment of APEX Data Storage Services. Dell Technologies handles much of the implementation and deployment effort for the composite organization, but the organization requires five FTEs to work a total of 20 hours for every 100TB assisting in the implementation, deployment, and migration of APEX Data Storage Services.

Modeling and assumptions. For the composite organization, Forrester estimates:

- The total planning costs are for 7 FTEs working 27.6 hours each to plan for a migration of the first 200TB of APEX Data Storage Services deployed without any planned downtime.
- The fully burdened hourly rate of an FTE is $60.
- For every 100TB of storage, the composite organization requires 20 person-hours for deployment and migration.
- The organization incurs implementation and deployment costs the year before any associated benefits with the investment.

- Five FTEs are trained for two hours each before deployment, and one additional FTE is trained in each of the following years.
- The organization requires 100 person-hours of ongoing management to check the APEX console several times weekly to oversee the functioning of APEX Data Storage Services.

Risks. The total internal costs of implementation and deployment may vary with:

- The number of services contracted.
- The rate of pay of FTEs participating in deployment and implementation.

Results. To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year, risk-adjusted total PV of $49,520.

Cost Of Implementation And Deployment

Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
E1	Total time spent planning (hours)	Survey	27.6	0.0	0.0	0.0
E2	Total FTEs involved	Survey	7	0	0	0
E3	Fully burdened hourly rate for implementation and deployment FTE	Composite	$60	$60	$60	$60
E4	Subtotal: Cost of planning	E1*E2*E3	$11,426	$0	$0	$0
E5	Total time to implement and deploy (hours)	Interviews	40	60	100	0
E6	Total time for training (hours)	Interviews	2	2	2	2
E7	Total FTEs who need training	Interviews	5	1	1	1
E8	Subtotal: Cost of implementation, deployment, and training	(E5+E6*E7)*E3	$3,000	$6,120	$12,120	$120
E9	Total person-hours dedicated to ongoing management	Interviews	$0	100	100	100
E10	Subtotal: Cost of ongoing management	E10*E3	$0	$6,000	$6,000	$6,000
Et	Internal costs from implementation and ongoing management	E4+E8+E10	$14,426	$12,120	$18,120	$6,120
	Risk adjustment	↑10%				
Etr	Cost of implementation and deployment (risk-adjusted)		$15,869	$13,332	$19,932	$6,732
	Three-year total: $55,865			**Three-year present value: $49,520**		

Conclusion

Forrester interviewed five IT decision-makers at four organizations and surveyed an additional 121 IT decision-makers to understand the potential impact of APEX Data Storage Services on their storage environments. Customers shared similar challenges in their current, on-premises storage environments, including:

- Difficulty forecasting on-premises storage needs.
- High storage infrastructure management costs.

As a result of their investment in APEX Data Storage Services, customers experienced or expected to experience:

- Reduced cost of on-premises storage infrastructure, valued by Forrester at between $2.7 million and $3.3 million.
- Improved efficiency of storage professionals, valued by Forrester at between $52,215 and $104,431.
- Improved storage procurement and provisioning processes, valued by Forrester at between $41,290 and $56,363.

These benefits directly relate to the amount of storage moved from the traditional environment to APEX Data Storage Services. For our modeled composite organization, 200TB is moved in the initial period, with a total of 1PB on APEX Data Storage Services by Year 3. These figures represent between 3.3% and 16.7% of the composite organization's total storage environment.

Additionally, customers shared experiencing or expecting to experience the following unquantified benefits:

- Improved employee productivity from accelerated storage deployment.
- Reduced end-of-term costs.
- Consistently up-to-date hardware.
- Repatriation of public cloud storage.
- Improved competitiveness.
- Reduced risk of under-provisioning.

In exchange for these benefits, Forrester modeled three-year, risk-adjusted costs of $1.45 million for APEX Data Storage Services and just under $50,000 of internal costs related to planning, deployment, training, and ongoing management.

Considering these benefits and costs, Forrester projected the following three-year NPVs for the composite organization by enabling APEX Data Storage Services:

- Projected high impact of a $1.9-million NPV and projected ROI of 129%.
- Projected medium impact of a $1.6-million NPV and projected ROI of 107%.
- Projected low impact of a $1.3-million NPV and projected ROI of 87%.

Net benefit value per TB

$1,298 to $1,929

Reduced over-provisioning costs

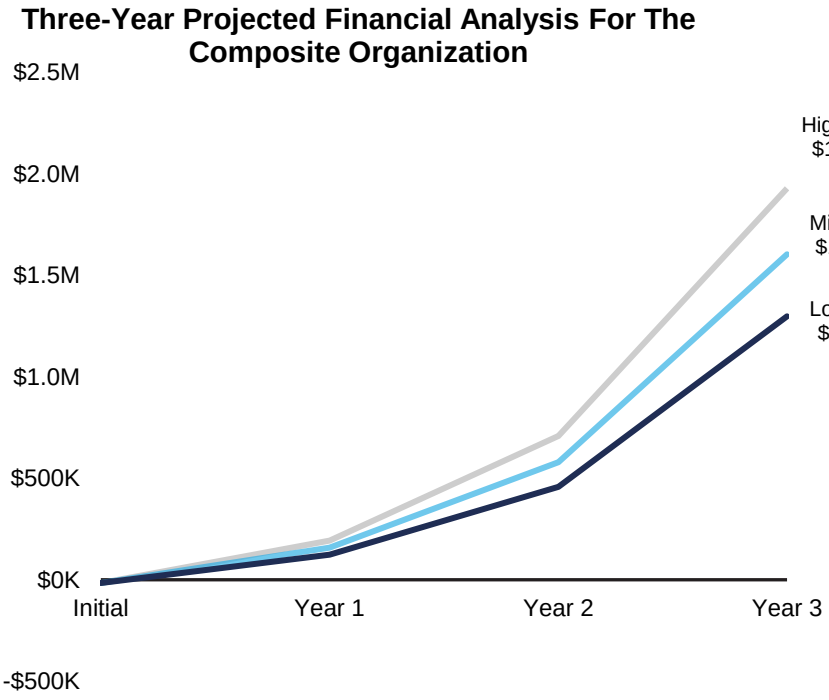
20% to 45%

Planning/provisioning savings

63% to 86%

Financial Summary

CONSOLIDATED THREE-YEAR RISK-ADJUSTED METRICS



The financial results calculated in the Benefits and Costs sections can be used to determine the PROI and projected NPV for the composite organization's investment. Forrester assumes a yearly discount rate of 10% for this analysis.

These risk-adjusted PROI and projected NPV 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	($15,869)	($182,844)	($568,619)	($1,128,154)	($1,895,487)	($1,499,624)
Total benefits (low)	$0	$337,071	$972,658	$2,245,975	$3,555,704	$2,797,712
Total benefits (mid)	$0	$374,029	$1,079,048	$2,491,119	$3,944,196	$3,103,416
Total benefits (high)	$0	$413,211	$1,192,050	$2,751,930	$4,357,192	$3,428,378
Net benefits (low)	($15,869)	$154,227	$404,040	$1,117,820	$1,660,217	$1,298,088
Net benefits (mid)	($15,869)	$191,185	$510,429	$1,362,964	$2,048,709	$1,603,792
Net benefits (high)	($15,869)	$230,367	$623,431	$1,623,776	$2,461,705	$1,928,754
PROI (low)						87%
PROI (mid)						107%
PROI (high)						129%

Appendix A: New Technology: Projected Total Economic Impact

New Technology: Projected Total Economic Impact (New Tech TEI) is a methodology developed by Forrester Research that enhances a company's technology decision-making processes and assists vendors in communicating the value of their products and services to clients. The New Tech TEI methodology helps companies demonstrate and justify the projected tangible value of IT initiatives to senior management and key business stakeholders.

TOTAL ECONOMIC IMPACT APPROACH

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

Projected Costs consider all expenses necessary to deliver the proposed value of the product. The projected cost category within New Tech TEI captures incremental ongoing costs over the existing environment that are 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%.

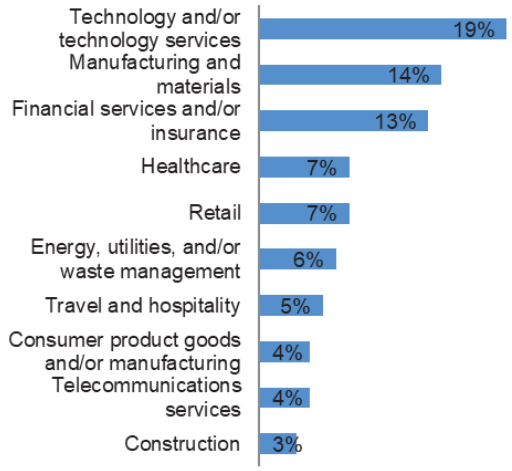
Appendix B: Interview and Survey Demographics

Interviewed Organizations

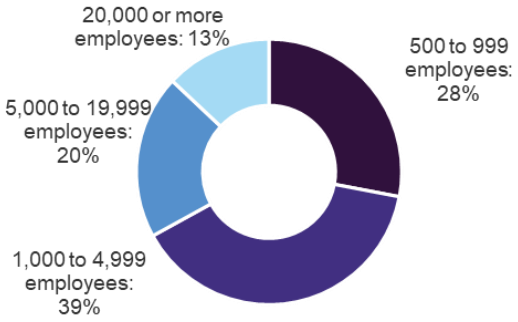
Industry	Region	Interviewee(s)	Employees; Revenue; Block Or File Services
Legal	US	Storage architect	1,000 employees; $780 million; file services
Healthcare	US	Director of business computing services	11,000 employees; $6 billion; Block services
Telecommunications	Global	Senior cloud solutions architect Storage architect	147,000 employees; $51 billion; Block services
Technology	Global	Product line architect	165,000 employees; $92 billion; File services

Survey Demographics

"Which of the following best describes the industry to which your company belongs?"



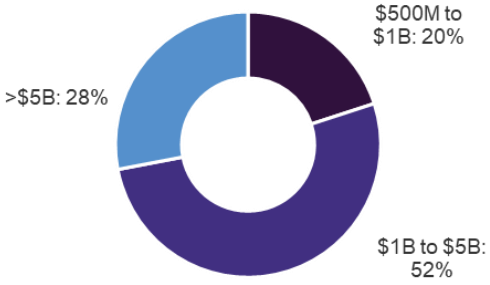
"How many employees work for your firm/organization worldwide?"



"In which country are you located?"

43%	The United States
17%	The United Kingdom
12%	France
11%	Germany
9%	Japan
8%	China

"What is your organization's annual revenue (USD)?"



Base: Base: 121 IT decision-makers responsible for storage
Source: A commissioned study conducted by Forrester Consulting on behalf of Dell, April 2021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