

FORRESTER®

The Total Economic Impact™ Of IBM Spectrum Scale

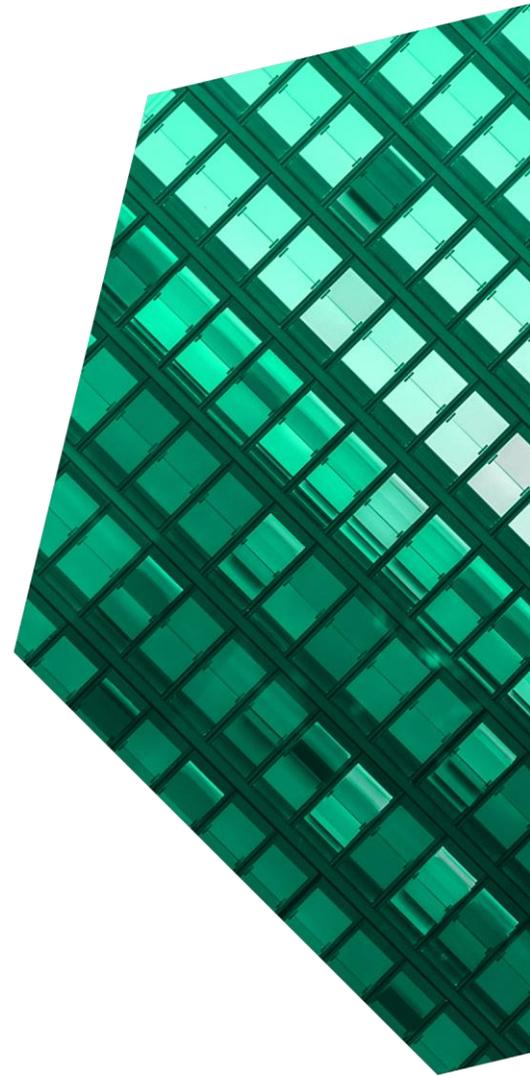
Cost Savings And Business Benefits
Enabled By Spectrum Scale

JANUARY 2022

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Executive Summary

IBM Spectrum Scale transforms disparate legacy storage silos into a unified, global data fabric and single namespace that increases productivity, reduces cost of ownership, and reduces downtime. Customers also benefit from the scalability and versatility of the file system, greater opportunity for innovation, and improved security and compliance.

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

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed five decision-makers with experience using Spectrum Scale. For the purposes of this study, Forrester aggregated the interviewees' experiences and combined the results into a single composite organization.

These interviewees said that prior to using Spectrum Scale, their organizations struggled with a need to improve the performance and reliability of their storage environments. However, prior attempts yielded limited success and left them with siloed,

“We’ve managed to unify the entirety of the data storage where we’re putting everything into one holistic fabric.”

CTO of research and advanced computing

KEY STATISTICS



Return on investment (ROI)

380%



Net present value (NPV)

\$1.39M

multivendor environments that created nebulous performance issues and bloated costs of ownership.

After investing in Spectrum Scale, the organizations utilized features such as the policy engine and active file management (AFM) to create a single unified view and take control of all data across their storage environments. Key results from the investment include reduced downtime, increased productivity, and decreased cost of ownership for data centers.

KEY FINDINGS

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

- **Reduction of downtime and disruptions worth \$806,000.** Spectrum Scale improves the reliability and performance of organizations' storage environments, which helps them avoid costly downtime that can impact user productivity.
- **Increased storage admin productivity worth \$565,000.** The global data fabric enabled by

Spectrum Scale provides organizations with a single source of truth that simplifies the work of the storage admin team.

- **Avoided cost of licensing and supporting siloed storage technology worth \$388,000.** Organizations can retire legacy storage solutions and reduce the cost of ownership for data centers.

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

- **Greater opportunity for innovation.** Spectrum Scale can remove network and storage constraints for users, which allows them to take full advantage of the computing power and resources available to them.
- **Improved security and compliance.** Being able to move data away from user devices, conduct proactive security patching, and use the policy engine to search and apply features like

encryption and immutability to millions of files improves environment security and compliance.

- **IBM support network.** IBM partners with Spectrum Scale customers to facilitate successful deployments of the solution and integrations of use cases while the global community of Spectrum Scale customers is also connected and shares experiences and best practices.

Costs. Risk-adjusted PV costs include:

- **Spectrum Scale licensing and support.** Organizations can deploy Spectrum Scale through IBM Elastic Storage System (ESS) hardware or they can avoid capex and deploy the solution on existing commodity hardware. For the composite organization, the costs of licensing and IBM support for Spectrum Scale is \$105,000 per year, and it has a three-year risk-adjusted present value of \$261,000.

“We’re putting power in the hands of the researcher ... to leverage millions of dollars’ worth of supercomputing storage [with] the click of a webpage. That is the special stuff.”

– CTO of research and advanced computing, research/academic

- **Ongoing support.** Including the benefit of avoided cost to support siloed storage technologies, the cost of ongoing support of Spectrum Scale is included as an offset to that benefit. For the composite organization, this cost totals \$88,000 over three years.
- **Training IT personnel.** Interviewees said IT personnel responsible for managing the solution required some training. For the composite organization, this cost totals \$17,000 over three years.

The decision-maker interviews and financial analysis found that a composite organization experiences benefits of \$1.76 million over three years versus costs of \$366,000, adding up to a net present value (NPV) of \$1.39 million and an ROI of 380%.

THE BOTTOM LINE

After a single year, the benefits of the Spectrum Scale solution will exceed the three year total costs.

Year 1 Benefits **\$547k**

Three Year Total Costs **\$440k**

In the following years, the benefits of the Spectrum Scale solution will continue to expand.

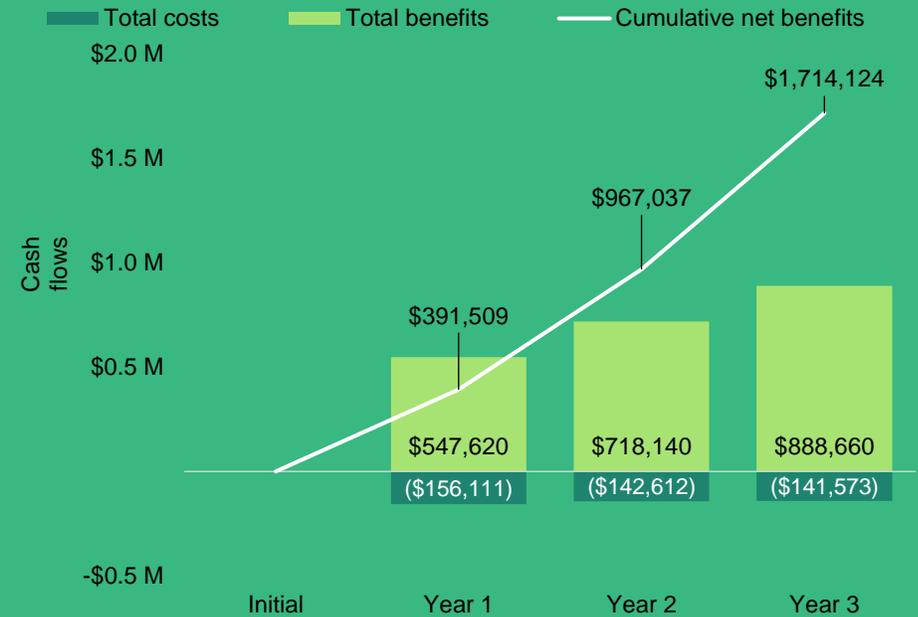
Three Year Total Benefits **\$2.2M**

“[IBM Spectrum Scale] met its requirements and exceeded them. We’ve had zero cases of data loss or data corruption in eight years, which I’ve never had that in any file system previously in 20 years of experience. ...It’s been extremely reliable.”

— Senior system administrator, research/academic



Cash Flow Chart (Risk-Adjusted)



“Using commodity hardware, we’re able to achieve greater than InfiniBand speed and manage the file system in less than a minute using the policy engine. We get compression, encryption in real time, incredibly useful statistics, and zero downtime. It’s hard to beat ... [and it’s] way cheaper than hardware-based solutions.”

– Senior application engineer, financial services

TEI FRAMEWORK AND METHODOLOGY

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

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 IBM Spectrum Scale can have on an organization.

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by IBM 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 the Spectrum Scale.

IBM 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.

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



DUE DILIGENCE

Interviewed IBM stakeholders and Forrester analysts to gather data relative to Spectrum Scale.



DECISION-MAKER INTERVIEWS

Interviewed five decision-makers at organizations using IBM Spectrum Scale to obtain data with respect to costs, benefits, and risks.



COMPOSITE ORGANIZATION

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



FINANCIAL MODEL FRAMEWORK

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



CASE STUDY

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

The IBM Spectrum Scale Customer Journey

■ Drivers leading to the Spectrum Scale investment

Interviewed Decision-Makers				
Role	Sector	Region	Users	Environment Capacity
Senior application engineer	Financial services	Headquartered in North America	700	500 TB
Senior system administrator	Academic/research	Headquartered in Asia Pacific	1,500	5.6 PB
CTO of research and advanced computing	Academic/research	Headquartered in Asia Pacific	5,500	66 PB
Research computing infrastructure architect	Academic/research	Headquartered in Europe	4,000	6 PB
Infrastructure architect	Manufacturing	Headquartered in Europe	200	200 TB

KEY CHALLENGES

The interviewees said their organizations struggled with common challenges, including:

- **Siloed, multi-vendor environments.** As organizations grow and different groups have multiple requirements, they accumulate a variety of disparate storage technologies and solutions. One decision-maker said: “We tended to use other siloed file systems. ... There was a mixture of things. People tended to buy disk arrays and technologies from [other vendors], and we put mixtures of file systems on top.”

The interviewee also said: “When you have multiple namespaces, people tend to do bad things because they move data between places. They’ll copy things, and they’ll make extra copies of data.”

- **Need to improve environments.** The growing complexity of storage environments that results from multiple namespaces and file systems can lead to performance issues and other challenges as organizational needs and requirements continue to grow. One interviewee told Forrester: “There was a need for more and more resources more and more compute capacity, and —

“I’ve managed other file systems, and they were nowhere as easy to manage as Spectrum Scale.”

Senior system administrator, academic/research

together with that — more and more storage capacity and storage performance. There were a lot of issues with performance with [our] previous data storage solution.”

Another interviewee said: “Using [our] previous solution, the storage was the bottleneck. [The provider] couldn’t even figure out if there was a performance bottleneck in their data pipeline or in the application itself.”

One interviewee said their organization sought a solution that could meet federal government requirements for improving research data storage infrastructure. The interviewee said: “My organization was picked as one of the national

tier-one facilities to host one of these services. ... The scope was to have highly available, highly resilient, and highly reliable storage so research data wouldn't be at risk or have any problem with being retained and accessed. It basically had to be relied upon to provide net operating incomes [NOIs] on research data service."

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 decision-makers 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 large, and 1,000 employees use a wide variety of disparate storage solutions the organization accumulated over time. Its current environment capacity of 5 PB ingests an average of 100 TB of data per day.

Key assumptions

- **1,000 users of disparate storage solutions**
- **5 PB environment capacity**
- **Ingests 100 TB of data per day**

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	Reduced downtime	\$324,000	\$324,000	\$324,000	\$972,000	\$805,740
Btr	Increased storage admin productivity	\$117,420	\$234,840	\$352,260	\$704,520	\$565,486
Ctr	Avoided cost of licensing and supporting siloed storage technology	\$106,200	\$159,300	\$212,400	\$477,900	\$387,778
	Total benefits (risk-adjusted)	\$547,620	\$718,140	\$888,660	\$2,154,420	\$1,759,004

REDUCED DOWNTIME

Evidence and data. Interviewees said the stability of IBM Spectrum Scale reduced the number of disruptions and amount of downtime personnel experienced. Interviewees said:

- “[Spectrum Scale] significantly reduced downtimes because we had daily and weekly issues with [our] previous solution. [Since deploying Spectrum Scale], I have never heard anyone complain that storage is a bottleneck.”
- “[Having] the ability to basically do a live migration when we expanded the storage was invaluable. We basically could move data from our old disk arrays into our new disk arrays without any downtime.”
- “We’ve successfully failed over with Spectrum Scale where we actually forgot to configure some disks. Spectrum Scale came up with a 20 TB hole and [at] close of business [that day], we [took] the missing replicated disks [online] and the 20 TB hole was solved. We didn’t have to take the file system down. ... We didn’t even miss an SLA with the 20 TB hole in our file system.”

- “[The encryption process] would typically be an offline process where the files would be offline while they were transitioning between encrypted and nonencrypted. [That] was the real hang-up [and] why we couldn’t use other solutions. ... With Spectrum Scale, we re-encrypted 400 terabytes of data so that it went from unencrypted to encrypted. We did it in the background with the policy engine nightly, and we got done in two weeks without any user impact.”
- “We’ve been able to reconfigure the arrays live without any loss of service or risk. [If] we wanted to take out a whole rack of storage, we could do that nondisruptively [with] no visible outage to the end users.”

“We never bring down the file system. ... Our [non-IBM] infrastructure has significantly more outages.”

*Senior application engineer,
financial services*

- “We lost the power for one rack, and there was no degradation in performance and no visibility of losing power on that rack to the end users because of [Spectrum Scale’s] distributed parallelized function. [We] could not do that with [an alternative solution].”
- “[A separate non-IBM environment that my organization uses requires] two different people every weekend [to restart]. [The environment is] literally down 400 hours a year.”

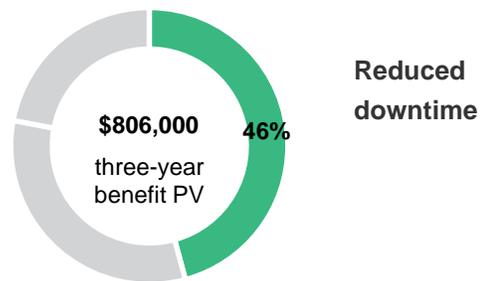
Modeling and assumptions. Forrester assumes the following in quantifying this benefit:

- The composite organization reduces downtime by 3 hours per month on average.
- The average cost of downtime is \$20,000 per hour.
- Half of the time saved is used for other productive, value-added activities.

Risks. The ability of an organization to reduce downtime to users through the deployment of IBM Spectrum Scale can vary due to differences in:

- The frequency, duration, and underlying causes of the organization’s prior disruptions.
- The ability of IT personnel to remediate service disruptions.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of \$806,000.



Reduced Downtime						
Ref.	Metric	Source	Year 1	Year 2	Year 3	
A1	Reduction of annual downtime since deploying Spectrum Scale (hours)	Interview	36	36	36	
A2	Average cost of downtime per hour	Assumption	\$20,000	\$20,000	\$20,000	
A3	Productivity recapture	Assumption	50%	50%	50%	
At	Reduced downtime	A1*A2	\$360,000	\$360,000	\$360,000	
	Risk adjustment	↓10%				
Atr	Reduced downtime (risk-adjusted)		\$324,000	\$324,000	\$324,000	
Three-year total: \$972,000			Three-year present value: \$805,740			

INCREASED STORAGE ADMIN PRODUCTIVITY

Evidence and data. Interviewees said IBM Spectrum scale increased the productivity of storage admins by providing their organizations with holistic views of their entire storage environments and features such as policy engine and AFM. Interviewees said:

- “You can get a snapshot done within an hour or two or less. When I used [non-IBM] storage and file systems, it would often take days to do snapshotting on relatively the same amount of data. I can’t believe how good it is when we’re doing backups [with Spectrum Scale].”

- “I don’t have a full-time person on my team who looks after Spectrum Scale. We run multiple storage systems [and] Spectrum Scale storage appliances, and we’ve got multi-petabytes of data. If you compare that to sort of the corporate kind of storage and virtualization team, they have people [whose] job is to do some stuff. Now, for the most part, it looks after itself.”
- “[With Spectrum Scale,] we’re able to reboot the node automatically. ... Our patch time is an hour max, and we’ve really only had four [required] outages in a year on average. It’s really a factor of Spectrum Scale allowing the virtualization part of it. To run that workload from a virtual machine enables incredibly high uptime. We don’t even know when there’s hardware failures on the frame. They’re just all being taken care of in the background.”
- “When the file system was running out of space rapidly because a single team was doing a very critical thing, we were able to adjust our code on the fly, take [the team] from 20 TB to 30 TB. At the same time, I was able to find every file across the file system that was [more] than five years [old] and greater than a gigabyte and just compress it silently until we could backfill the space. There’s no other file system in the world

“Because [Spectrum Scale] works well and is very stable, we don’t have to put a lot of staff time into running it. That gives us the opportunity to work on other cool things and make research systems better.”

Research computing infrastructure architect, academic/research

“We did testing with AI and machine learning workloads with Spectrum Scale and [it] outperformed all other file systems that we tested against.”

Senior system administrator, academic/research

that would have let me do that, and the scripting of it was incredibly simple.”

- “We’re able to do a scan of our 1.3 million files in our file system in less than a minute. I’m able to build a report of every type of file whether it’s compressed or not compressed [and specify] who the owner is, and what the file names are, [and] and be able to do it in less than a minute. ... Our other file system is a lot bigger, but it takes a week to build a file index. [With Spectrum Scale,] I can do it in a minute.”
- “The policy engine is really helping with security-related tasks because it’s able to quickly select [relevant files]. We have multiple tens of millions of files, and that’s really not easy with any of the [other] file systems you can find on the market.”
- “My team started at five [people] when we were [using] 27 TB and [had] 70 users. Now, we [have] 700 users and 500 TB, and [my team is] down to three [people].”
- “As far as running [an alternative solution], I need two or three more people.”
- “We had two people managing this file system. But, effectively, you need only [0.5 FTE] per day. We could run 5.6 PB of storage with two staff [members]. When we had [our legacy storage solution], we had a team of six running half that amount of space and storage capacity.”

Modeling and assumptions. To quantify this benefit, Forrester assumes the following:

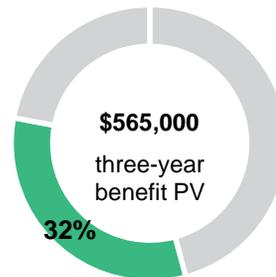
- Prior to using Spectrum Scale, the composite organization needed four storage admins to support its legacy environment with siloed multivendor solutions.
- Spectrum Scale reduces the effort needed to manage the environment by one FTE each year, so they can work on other value-added projects.

Risks. The ability of an organization to increase storage admin productivity through the deployment of IBM Spectrum Scale can vary due to differences in:

- The ability of storage admins to be assigned to other value-added activities.

- The presence of other value-added activities at the organization.

Results. To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year, risk-adjusted total PV of \$565,000.



Increased storage admin productivity

Increased Storage Admin Productivity					
Ref.	Metric	Source	Year 1	Year 2	Year 3
B1	Storage admins needed to support legacy environment	Interview	4	4	4
B2	Storage admins needed to manage environment with Spectrum Scale	Interview	3	2	1
B3	FTEs available for other productive tasks	B1-B2	1	2	3
B4	Fully burdened annual salary of experienced storage admin	Assumption	\$123,600	\$123,600	\$123,600
Bt	Increased storage admin productivity	B3*B4	\$123,600	\$247,200	\$370,800
	Risk adjustment	↓5%			
Btr	Increased storage admin productivity (risk-adjusted)		\$117,420	\$234,840	\$352,260
Three-year total: \$704,520			Three-year present value: \$565,486		

AVOIDED COST OF LICENSING AND SUPPORTING SILOED STORAGE TECHNOLOGY

Evidence and data. As organizations grow and business needs change, they can accumulate siloed storage technologies and ad hoc solutions to manage file systems, which creates overly complicated and unreliable environments. Disparate solutions require more specialized resources and additional time to manage and resolve any problems that may arise.

Interviewees said IBM Spectrum Scale provided a single source of truth for storage teams and users and that it reduced or eliminated the need for their organizations to continue supporting siloed technologies. Interviewees said:

- “We were able to retire [a legacy] tool. ... [We] migrated all the data out of that system, and then we could decommission it. We were saving ourselves approximately \$80,000 per [year] worth

of support. ... We consolidated a number of smaller independent file systems [and] removed a couple of network-attached storage (NAS) filers. [We saved] about \$100,000 per [year], so we rolled those two functions into this portal and this file system.”

- “We’re licensing one technology now. ... We’re better than we were because we don’t have five technologies, all of which [were] arcane and weird. ... We’re not costing five or eight different buckets of money. We are costing one, and we can cost-control better for the organization. ... [The cost] was [\$59,000] per site for [our previous] technologies, and there were five of those sites.”

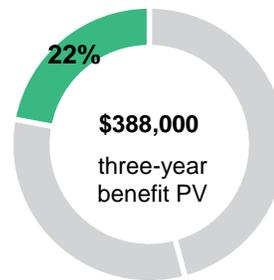
Modeling and assumptions. Forrester assumes the following in modeling the value of this benefit:

- The annual cost of licensing and support for the composite organization’s single legacy storage technology is \$59,000.
- The composite can retire two siloed storage technologies in Year 1 and one additional technology each subsequent year.

Risks. The ability of an organization to avoid licensing and support costs for legacy solutions as a result of deploying Spectrum Scale can vary due to differences in:

- The presence of legacy technologies.
- The ability and willingness of the organization to retire legacy solutions.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of \$388,000.



Avoided cost of supporting siloed storage technology

Avoided Cost Of Licensing And Supporting Siloed Storage Technology					
Ref.	Metric	Source	Year 1	Year 2	Year 3
C1	Cost of licensing and supporting siloed storage technology	Interview	\$59,000	\$59,000	\$59,000
C2	Number of retired storage technologies	Interview	2	3	4
Ct	Avoided cost of licensing and supporting siloed storage technology	C1*C2	\$118,000	\$177,000	\$236,000
	Risk adjustment	↓10%			
Ctr	Avoided cost of licensing and supporting siloed storage technology (risk-adjusted)		\$106,200	\$159,300	\$212,400
Three-year total: \$477,900			Three-year present value: \$387,778		

UNQUANTIFIED BENEFITS

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

Greater opportunity for innovation. Interviewees said Spectrum Scale had benefits on research and developmental processes. They said:

- “[Spectrum Scale] speeds research outcomes. It accelerates [them] because you’re not waiting for a file system to balance out. It’s online all the time, so you can improve the velocity of research.”
- “When you’ve got an array capable of a million input-output operations per second and 100 GB or 80 or 90 GB a second or whatever compared to a thing that could do four [per second], you can get more science done.”
- “There are no bottlenecks for the developers. That has an impact on the product and the whole organization.”

Improved security and compliance. Interviewees said Spectrum Scale facilitated security and compliance efforts at their organizations. They said:

- “Security patching is very proactive, so we would roll in security patches basically before the exploit was out in the wild. That was also a very good feature because we want to make sure we’re secure. We don’t risk our researchers’ data. ... IBM is very proactive on that front.”
- “We’re able to provide very quick reporting to our users, which improves security because ... when things are out of alignment, we’re aware of it. That’s an advantage of being able to interrogate the file system quickly.”
- “From a corporate governance perspective, moving data away from people’s own devices and off random USB sticks is important to us as an organization because there’s a lot of intellectual property [in that data]. [It’s not great if] people have it all over the place. Having a corporate governance structure and that kind of ownership and running the storage systems allow us to manage that.”
- [Regarding security and compliance,] we’ve never missed an SLA job since I’ve been at the [organization].”

- [There is] much pain [regarding the consequences of missing SLAs related to compliance and regulatory requirements]. We don’t want to find out [what the consequences are]. There are some very critical regulatory reports that take multiple days to build, and we’ve never missed one of those. ... We’re able to build a lot of applications within our SAS environment because of the stability and the guaranteed performance.”

IBM support network. Interviewees spoke highly about the expertise and support provided by IBM and its partners. They said:

- “[IBM is] actually very good at giving us support. ... We’ve had a lot of issues with support of [other storage solutions]. ... We have not had that experience with IBM support, and that’s really important. IBM [was] very, very quick to respond to us. [Things] happen, but it’s about responding and dealing with the customer afterward and actually showing their data is not dead.”
- “We run [events] all over the world ... and we get people traveling from all over the world to go [meet] the best speakers and customers. ... We get a lot of people ... to come and learn about it partly because they get to talk to IBM developers,

“[Spectrum Scale] has dramatically increased the efficiency of [our] development life cycle. We are able to conduct more experiments and seamlessly connect the environment.”

Research computing infrastructure architect, academic/research

but [also because] they get to hear from other customers and learn things there as well. ... There's a big community around that. ... We have [IBM] developers come and talk about what they have been doing and have people ask them questions, and people don't hold back. ... Product management is [also] involved and engages with us as well."

FLEXIBILITY

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

- **Scalability.** The storage environments of the interviewees' organizations ranged from 200 TB to 66 PB and included all types of storage media and use cases. Spectrum Scale is scalable to eight YB of capacity allowing organizations to add capacity and scale as needed. Interviewees told Forrester of their experiences with scalability of Spectrum Scale. Interviewees said: "The

Spectrum Scale difference is that you build it to the task. You can define it to the task that you need. You can scale up the part that you need, which isn't typical."

- "As time goes on, we are able to plant more and more different technologies into [Spectrum Scale]. One of the keys of Spectrum Scale is that it allows us to present different protocols out of the storage, so I can be very flexible. So, say ... I want to present SM betas in Windows desktops or Mac desktops or laptops. I want to present an [Amazon] S3 bucket so that we can get a little cloudy. I want to talk FTP or grid FTP to it. I want to take NFS to it today or ... I want to just talk raw data POSIX (portable operating system interface) supercomputing client too. I'll do that today."
- "We've only had two hardware generations, and we've been able to slide everything forward. It's really been an incredible direct

"[IBM Spectrum Scale is] trusted by a number of Fortune 500 companies and banks [because] it's extremely reliable. ... If it's trusted by banks and finance organizations, we were assured we could trust it with research data."

— Senior system administrator, research/academic

lineage of just constantly improving the architecture of each generation. With other technologies, you don't really get that. You're not able to tweak your NFS [configuration] and get double, triple, [or] quadruple the performance out of it. Spectrum Scale lets you go linearly just more and more and more. And [so does IBM] AIX (Advanced Interactive eXecutive), for that matter. They go hand-in-hand with just being very linearly able to scale up."

- **Versatility.** Interviewees said Spectrum Scale enhanced and expedited a broad range of use cases for their organizations. One interviewee said: "[Spectrum Scale is] able to handle new and emerging workload use cases. ... This works really well with [our] data portal, and that's our primary method of use. But it works very well with other types of workloads including bio-related workloads, [such as] DNA searching, string searching, etc. And you can use HDFS (Hadoop Distributed File System) on top of [the policy engine] for biomedical [searches]. It's a very useful file system if you're looking at new types and new areas of research, which includes a lot of sciences."
- **Leveraging containerized workloads.** Spectrum Scale can also integrate containerized workloads into the unified data fabric of an organization. One interviewee said: "We have a blossoming use of Kubernetes and other parts of orchestrated workflow and containerized workload. There [are] functions within Spectrum Scale that enable you to use this file system with containerized workloads on the paired user bases, so that's really good."
- **Democratization of new feature releases.** IBM engages Spectrum Scale customers to determine enhancements or updates to the file system. One interviewee said: "Customers are able to rank and request feature enhancements, which is

unique. For a commercial file system, that's of great benefit. You can get what you need added to the file system to make it easy to manage. ... [Otherwise,] you'd have to pay for it. There is an ability for companies to actually to do paid feature enhancements and paid fixes, but there's also the ability to get fixes for free because we pay support to IBM for the file system. That includes problem resolution and basically service tickets, but it also covers feature enhancements. So, it's quite unique."

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

“Being able to abstract away from the storage and just give the user access by pretty much any protocol technology I want [is] very powerful.”

CTO of research and advanced computing, research/academic

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	IBM Spectrum Scale licensing and support	\$0	\$105,000	\$105,000	\$105,000	\$315,000	\$261,119
Etr	Internal efforts to support Spectrum Scale	\$0	\$35,535	\$35,535	\$35,535	\$106,605	\$88,370
Ftr	Training IT personnel	\$0	\$15,576	\$2,077	\$1,038	\$18,691	\$16,657
	Total costs (risk-adjusted)	\$0	\$156,111	\$142,612	\$141,573	\$440,296	\$366,146

IBM SPECTRUM SCALE LICENSING AND SUPPORT

Evidence and data. Interviewees said that the annual cost for licensing and support for the Spectrum Scale solution is approximately \$100,000.

Modeling and assumptions. Forrester assumes the annual cost of licensing and support for the composite organization is \$100,000.

Risks. The cost of the IBM Spectrum Scale licensing and support can vary across organizations due to differences in configuration, consumption, and potential discounts based on vendor and volume.

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 \$261,000.



Licensing and support

IBM Spectrum Scale Licensing And Support							
Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3	
D1	IBM Spectrum Scale licensing and support	Interview	\$0	\$100,000	\$100,000	\$100,000	
Dt	IBM Spectrum Scale licensing and support	D1	\$0	\$100,000	\$100,000	\$100,000	
	Risk adjustment	↑5%					
Dtr	IBM Spectrum Scale licensing and support (risk-adjusted)		\$0	\$105,000	\$105,000	\$105,000	
Three-year total: \$315,000				Three-year present value: \$261,119			

INTERNAL EFFORTS TO SUPPORT SPECTRUM SCALE

Evidence and data. Interviewees said Spectrum Scale helped their organizations avoid the costs of supporting siloed storage technologies.

Modeling and assumptions. Forrester assumes the following in quantifying this cost:

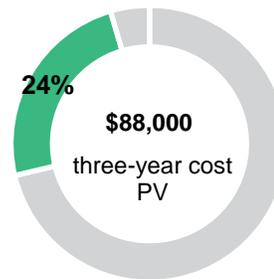
- The average level of ongoing effort needed to directly manage the Spectrum Scale solution is 0.25 FTEs.
- The average fully burdened annual salary for a storage team member is \$123,600.
- To properly account for the net benefit attributable to the integration of Spectrum Scale, the cost of ongoing support of Spectrum Scale is included in the analysis.

Risks. The cost of ongoing support of Spectrum Scale can vary across organizations due to differences in:

- The size and complexity of environments.
- The experience and skill set of internal staff.

“It’s a complete solution with fantastic support.”
Senior system administrator, academic/research

Results. To account for these risks, Forrester adjusted this cost upward by 15%, yielding a three-year, risk-adjusted total PV of \$88,000.



Internal efforts to support Spectrum Scale

Internal Efforts To Support Spectrum Scale						
Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
E1	FTEs supporting Spectrum Scale	Composite	0	0.25	0.25	0.25
E2	Fully burdened annual salary of experienced storage admin	Assumption	\$0	\$123,600	\$123,600	\$123,600
Et	Internal efforts to support Spectrum Scale	E1*E2	\$0	\$30,900	\$30,900	\$30,900
	Risk adjustment	↑15%				
Etr	Internal efforts to support Spectrum Scale (risk-adjusted)		\$0	\$35,535	\$35,535	\$35,535
Three-year total: \$106,605			Three-year present value: \$88,370			

TRAINING IT PERSONNEL

Evidence and data. Interviewees said their organizations' IT personnel participated in varying levels of training to get started with Spectrum Scale. The training programs lasted from three to 10 days after deployment, and there is also ongoing learning on the job and additional training as updates and new features are introduced over time.

Modeling and assumptions. Forrester assumes the following in quantifying this cost:

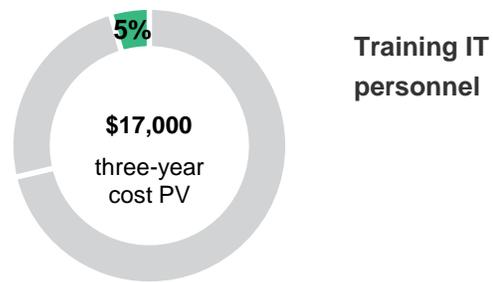
- IT personnel managing the Spectrum Scale solution spend 80 hours in direct training and on-the-job training in Year 1.
- In years 2 and 3, IT personnel spend 16 hours training and self-learning as new features and updates are introduced.
- The average fully burdened hourly salary for a storage team member is \$59.

Risks. The cost of training can vary across organizations due to differences in the experience and skill sets of IT personnel.

“People are able to actually get results quicker as a [result] of ... [having] generationally faster storage technologies. That’s where value comes in.”

CTO of research and advanced computing, research/academic

Results. To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year, risk-adjusted total PV of \$17,000.

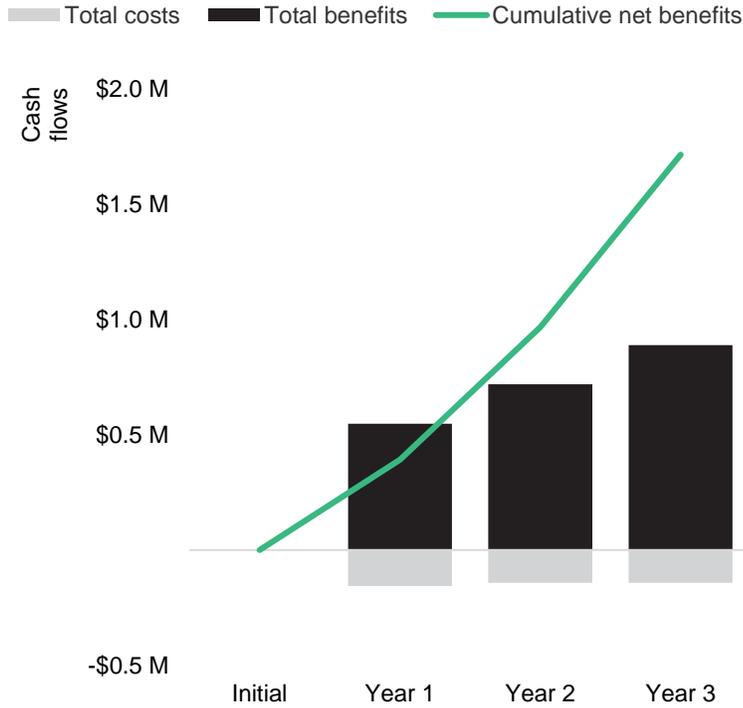


Training IT Personnel						
Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
F1	IT resources receiving training	Composite	0	3	2	1
F2	Average hours spent learning functionality of Spectrum Scale and optimizing deployment	Interview	0	80	16	16
F3	Fully burdened hourly salary of experienced storage admin	Assumption	\$59	\$59	\$59	\$59
Ft	Training IT personnel	F1*F2*F3	\$0	\$14,160	\$1,888	\$944
	Risk adjustment	↑10%				
Ftr	Training IT personnel (risk-adjusted)		\$0	\$15,576	\$2,077	\$1,038
Three-year total: \$18,691			Three-year present value: \$16,657			

Financial Summary

CONSOLIDATED THREE-YEAR RISK-ADJUSTED METRICS

Cash Flow Chart (Risk-Adjusted)



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

These risk-adjusted ROI, NPV, and payback period values are determined by applying risk-adjustment factors to the unadjusted results in each Benefit and Cost section.

Cash Flow Analysis (Risk-Adjusted Estimates)

	Initial	Year 1	Year 2	Year 3	Total	Present Value
Total costs	\$0	(\$156,111)	(\$142,612)	(\$141,573)	(\$440,296)	(\$366,146)
Total benefits	\$0	\$547,620	\$718,140	\$888,660	\$2,154,420	\$1,759,004
Net benefits	\$0	\$391,509	\$575,528	\$747,087	\$1,714,124	\$1,392,858
ROI						380%

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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