White Paper

Pure Storage: Transforming Healthcare

The Economic Impacts of Pure Storage's All-flash Technology on the Healthcare Industry

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Executive Summary

For the healthcare industry, access to the right information in a timely manner for care delivery can be, and often is, life saving. A variety of industries are looking toward information technology (IT) either as a means to enter new markets, better serve their customers, or achieve a more operationally efficient workforce, but in healthcare, these opportunities are intensified by the mission critical nature of patient data and information. Healthcare data is often generated across multiple isolated silos within the health system. These can include electronic medical records (EMR), administrative, financial and billing systems, human resources, and departmental systems like the laboratory, radiology, and pharmacy. Each data set, whether clinical or administrative, has its own constraints, storage requirements, and dependencies. Radiology has particularly large storage requirements, as the use of medical images grows, further increasing the scale of picture archiving and communication system (PACS) data that must be protected seemingly indefinitely.

The healthcare industry is also subject to significant and frequently changing regulations. Payment and billing processes, with health insurance companies acting as intermediaries between patients and providers, are complex. The added regulatory requirements for how patient information is protected, as defined in the Health Insurance Portability and Accountability Act of 1996 (HIPPA), increase the cost and complexity of almost every IT initiative in healthcare. The bottom line is that as more industries turn to IT to enable business success, the same goals in the healthcare industry are often an order of magnitude more complex and costly to achieve. As a result, the IT infrastructure, especially the storage infrastructure, must be built to enable healthcare organizations to meet these increased challenges and new opportunities.

As traditional storage architectures become unsustainable, flash storage delivers an advantage that can help health systems to transform the management of patient data. One industry innovator leading the charge with all-flash storage is Pure Storage. Recently, ESG was able to speak with some of Pure Storage's customers in the healthcare industry to better understand how Pure's all-flash technology helped them transform their data centers and better serve their patients and their business.

The Challenges of Digital Transformation

Recently, ESG conducted an in-depth research study in order to assess IT spending priorities over the next 12-18 months. The study covered 641 IT professionals representing midmarket (100 to 999 employees) and enterprise-class (1,000 employees or more) organizations in North America and Western Europe. All respondents were personally responsible for or familiar with their organizations' IT spending as well as their 2017 IT budgets. As part of this study, ESG asked IT decision makers to identify the top five business initiatives that are driving technology spending for the next 12 months.[1] The results in Figure 1 are for those IT decision makers that also identified their business as being in the healthcare industry. The chart offers a view into the balance that IT decision makers in healthcare are trying to achieve: meet existing IT commitments and enable new digital opportunities, all while trying to maintain or reduce costs.

Reviewing the findings in Figure 1 in more detail, three themes emerge:
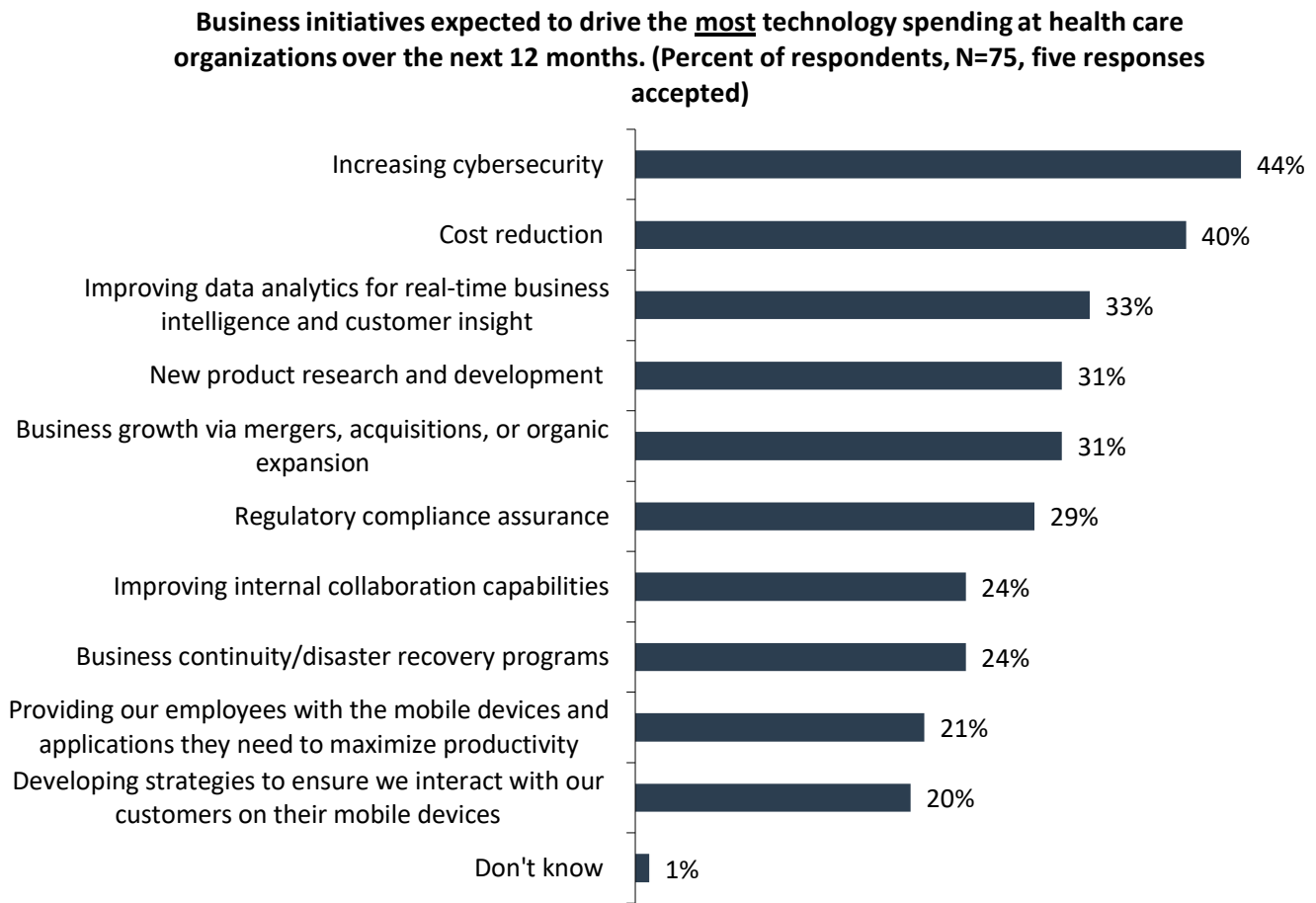
- **Transforming the business through data:** A couple of frequently cited initiatives identified in this research response reveal a demand for IT investment to fuel a smarter, more efficient, and more capable business. These include improving data analytics as the third most commonly identified response, along with new product research and development being the fourth most-often cited. These results align with conversations ESG held with healthcare executives during the study into the impact of Pure's technology.

- **Securing data as demands increase:** As businesses become more digitally dependent, digital security is paramount. The healthcare industry, which is often the target of malicious attacks, is no exception. It is no surprise that the most

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[1] Source: ESG Research Report, *2017 IT Spending Intentions Survey*, March 2017.

commonly identified initiative driving IT spending in the study was increasing cybersecurity. In addition, improving regulatory compliance assurance initiatives was the fourth most frequently cited response.

- **Controlling costs while meeting these increased data demands**: Despite increased IT demands, the requirement to contain or reduce costs is ever-present. The second most commonly identified initiative driving new investment in IT was reducing the cost of IT infrastructure, whether through capital outlays or through operational expenses. Healthcare organizations are becoming ever more cost-sensitive with the demands of new regulations, making cost containment, whether clinical or IT-based, a high priority.

Figure 1. Business Initiatives Driving Technology Spending in the Healthcare Industry

Business initiatives expected to drive the most technology spending at health care organizations over the next 12 months. (Percent of respondents, N=75, five responses accepted)

Initiative	Percent
Increasing cybersecurity	44%
Cost reduction	40%
Improving data analytics for real-time business intelligence and customer insight	33%
New product research and development	31%
Business growth via mergers, acquisitions, or organic expansion	31%
Regulatory compliance assurance	29%
Improving internal collaboration capabilities	24%
Business continuity/disaster recovery programs	24%
Providing our employees with the mobile devices and applications they need to maximize productivity	21%
Developing strategies to ensure we interact with our customers on their mobile devices	20%
Don't know	1%

Source: Enterprise Strategy Group, 2017

In summary, these three themes combine to illustrate the contradiction of increasing IT capabilities while simultaneously reducing costs present in multiple industries, including healthcare. Increasing the level of difficulty, IT departments in healthcare must keep pace with data growth and enable new business initiatives while meeting increasingly stringent security and regulatory requirements. Addressing this contradiction with status quo storage infrastructure technology is simply unsustainable. In other words, meeting these demands requires the deployment of modern and more transformational technologies, such as all-flash storage.
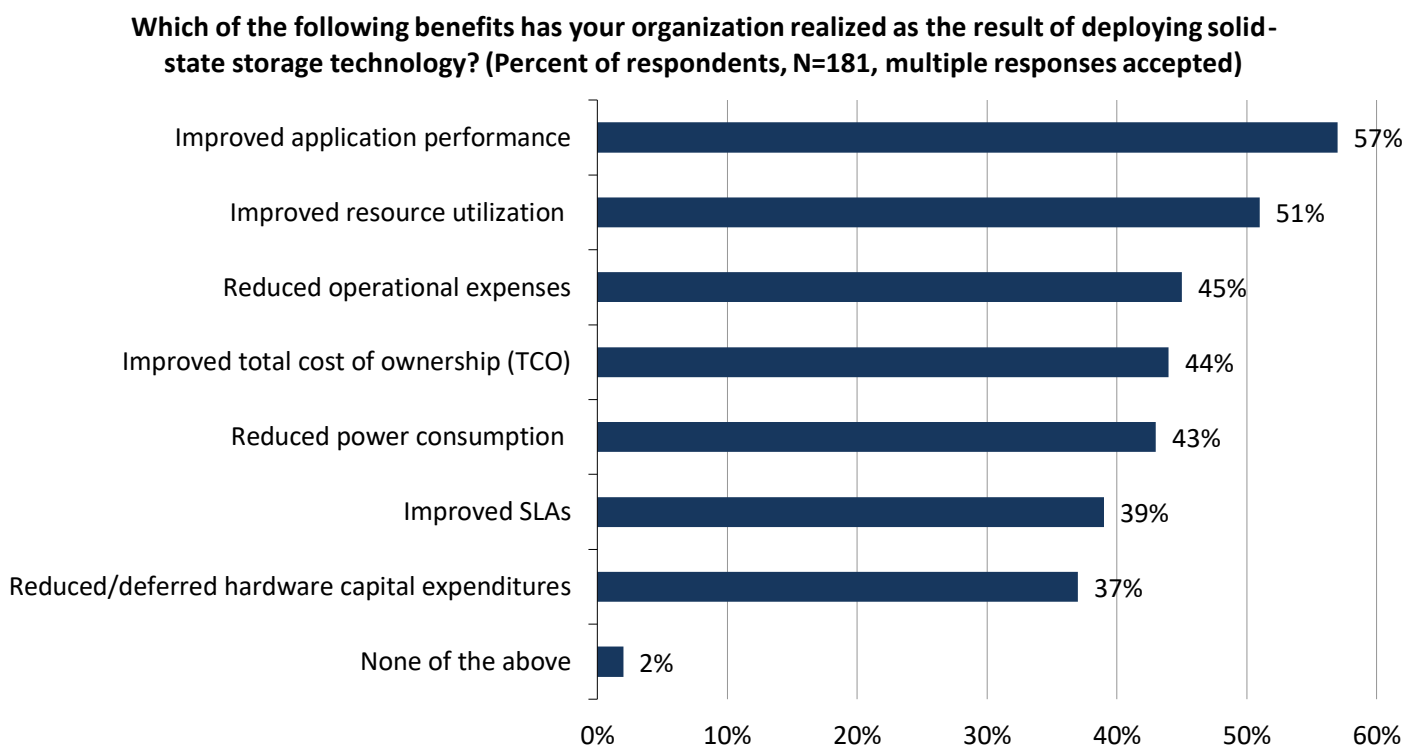
Transforming the Data Center with All-flash

To better understand the state of the enterprise storage industry, ESG conducted a separate storage-technology-focused research study of over 300 storage decision makers on the impacts of multiple storage technologies, including all-flash

storage. When storage decision makers whose IT organizations had already deployed flash technology were polled on the benefits their organizations received from those deployments, the results (see Figure 2) revealed that flash and all-flash storage offers far more than just performance.[2]

Mechanical hard drives have long served as the predominant bottleneck in the data path. As a bottleneck, the remaining infrastructure, the applications, the servers, and even the networking were typically limited by the performance of the storage. The introduction of flash storage eliminates the storage system as the bottleneck. While the most obvious result is faster application performance, the infrastructure also becomes more efficient and more cost effective. Less infrastructure is required to deliver the same capability, which in turn requires less power, less cooling, and less management effort, further increasing the benefits of flash storage.

Figure 2. Benefits Realized after Deploying Solid-state (Flash) Storage

Which of the following benefits has your organization realized as the result of deploying solid-state storage technology? (Percent of respondents, N=181, multiple responses accepted)

Benefit	Percent
Improved application performance	57%
Improved resource utilization	51%
Reduced operational expenses	45%
Improved total cost of ownership (TCO)	44%
Reduced power consumption	43%
Improved SLAs	39%
Reduced/deferred hardware capital expenditures	37%
None of the above	2%

Source: Enterprise Strategy Group, 2017

Providing additional evidence of the overall savings that flash storage can provide, 44% of storage decision makers polled identified a reduction in total cost of ownership (TCO). Ultimately, flash delivers a faster, more efficient, and more cost effective infrastructure. Additionally, current industry trends have delivered substantial decreases to the cost of flash storage components, which in turn has decreased the upfront costs of deploying all-flash storage, further increasing the cost benefits.

This increased performance and efficiency has become a necessity for the healthcare industry and its industry-specific workloads. All-flash storage can dramatically reduce wait times for a variety of clinical workflows in applications like the electronic health record (EHR), such as entering patient information, reviewing charts, or medication administration while also improving the infrastructure's ability to scale in order to meet the increasing volumes of patients and their corresponding records. The performance density of all-flash storage also provides consolidation benefits to virtualization-

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[2] Source: ESG Research Report, *2015 Data Storage Market Trends*, October 2015.

based workloads, such as application virtualization or for virtual desktop infrastructure (VDI) environments. The greater performance from all-flash storage translates into more virtual machines on the same infrastructure.

Additionally, all-flash technology delivers the necessary incremental performance to layer on analytics to existing data sets without impacting application latencies. The benefits of incremental performance also extend to the integration of increased security or compliance (such as HIPAA) measures on healthcare applications. As a result, the impacts of all-flash storage are often transformational for businesses, but not every all-flash product or vendor is the same. For example, Pure Storage has augmented the technological benefits of all-flash storage with a wealth of incremental capabilities and support infrastructure to deliver an economically beneficial solution.

The Economic Case for Pure Storage in Healthcare

As a leader in all-flash technology, Pure Storage offers multiple storage solutions targeted at block and unstructured data workloads, with its FlashArray//M, FlashArray//X, and FlashBlade products. With its Pure1 Cloud management, a general IT administrator can monitor and manage arrays spread across the globe without the need for dedicated management servers. To complete the solution, Pure offers its Evergreen Storage commitment designed to provide a cloud-like approach to infrastructure support and services, including benefits such as all inclusive software features like future roadmap functionality, flat maintenance costs, and a free controller upgrade ever three years.

In order to validate the impacts of Pure's offering in the field of healthcare, ESG conducted detailed interviews with Pure Storage customers in the healthcare industry. As part of these interviews, ESG was able to identify and verify a myriad of economic benefits spanning both capital infrastructure savings and operational efficiencies.

Traditional Storage Infrastructure Savings

In interviews with Pure Storage customers, ESG verified multiple benefits that resulted in measurable storage and IT infrastructure savings. These benefits included:

- **Improved application performance:** When interview participants were asked why they selected Pure Storage for their deployment, performance was introduced as one of the driving factors in each conversation. As an example, one director of infrastructure and operations highlighted that performance issues with the previous storage infrastructure solution had become a significant burden. During the discussion he said, "One of the big highlights of us moving to Pure was… We were having consistently inconsistent [slowdowns], things we couldn't track down. It might have been someone ran a query. It might have been something else. Since moving to Pure, we have not had any of that."

"Pure will cost half or less of what the legacy hardware would have cost us."

Director of IT, Healthcare

When asked to quantify the business impact of the performance challenges, he went on to provide a couple of examples: "[Our customer service team] had people on the phone trying to service [patients], and they were complaining it was slow because they were trying to get the customers the information they need. Also, the claims processers are paid by the claim, so anytime it slowed down it affected their bottom line." According to the participant, neither team has reported any performance issues since moving to Pure.

- **Improved workload consolidation:** Rather than deploy applications across multiple disparate infrastructure silos, the performance density offered by Pure's all-flash storage delivers increased workload consolidation. For one Pure Storage customer who participated in the study, Pure's technology enabled a second site for disaster recovery. According to the director of IT, "Pure will cost half or less of what the legacy hardware would have cost us." He

continued, "With our legacy hardware it would not be practical for us to purchase or find the space for a redundant configuration, [but] with Pure hardware at such a small footprint and lower overall price, we can afford to evaluate having a true hot site for disaster recovery, which is important for healthcare where uptime is everything."

- **Improved storage efficiency with a focus on driving down the cost of flash:** While the performance density offered by all-flash technology enables capital costs savings through workload consolidation, Pure Storage is able to extend those benefits further with storage efficiency features and component cost reductions. As an example, one customer estimated the improvement over the previous architecture, "Pure Storage has allowed us to reduce the capital expense by 10-20%." In another example, a director of IT infrastructure and operations identified Pure's ability to leverage flash component cost reductions and then pass those savings on to the customer by saying, "They have done a very good job of keeping our costs down. They make sure they pass those savings on to their customer when they get savings on the hardware."

- **Ability to leverage existing all-flash storage investment:** The ability to upgrade controllers for free and leverage existing investment as part of Pure's Evergreen program was identified as a critical part of the decision to select Pure's all-flash technology. One respondent, a manager of storage infrastructure, who recently had performed the included controller upgrade after the three-year time period noted, "It's seamless, we told the business unit we doing it, and we did it right during their batch schedule and they didn't see any hiccups." A director of infrastructure and operations also commented on Pure's Evergreen program by saying, "Non-disruptive everything is a nice thing."

- **Less hardware infrastructure to deploy, maintain, and support:** As an extended benefit of the workload consolidation delivered by Pure's all-flash storage, multiple customers identified a reduction in required infrastructure. In addition, the extended efficiencies to the remainder of the data path enabled less supporting infrastructure, such as servers, networking, and backup infrastructure. As an example of the combined impact, one manager of storage infrastructure noted, "The way we figure how much storage costs us, [our previous solution] was about $19/GB with the price of the system and loading in some other costs as well, [and] with Pure we got that down to about $5/GB." In a separate conversation, a director of IT said, "Overall the ease of management, the smaller footprint, and the total cost is much less than buying the legacy hardware configuration we used to buy."

> *"Pure has helped us. Our upgrades are easier. Our day-to-day interaction is less with Pure."*
>
> Manager of Storage Infrastructure, Healthcare

- **Improved migrations/upgrades:** Due to a combination of the performance capability offered by Pure's all-flash technology and the simple controller upgrade process offered by its Evergreen program, Pure was identified as having dramatically simplified the data migration process. This was indicated when a customer migrated data to the system after initial deployment, but the real benefits were seen when a controller upgrade was required and the data could remain online and in place, while the entire process took very little time. One manager of storage infrastructure said, "I remember the first firmware upgrade we did with Pure, I was going to watch them do it and there was something I needed to do first, and by the time I got down there it was already done. It was like less than 15 minutes."

Storage Management and Other Economic Benefits

In addition to the capital infrastructure benefits delivered by Pure Storage, ESG was able to verify significant savings to both the operational and management costs of storage infrastructure. Some of the benefits that ESG identified included:

- **Expedited new storage and application deployment:** After deploying Pure Storage, participants commented on the ease of using the solution as well as the speed at which new applications could be deployed. For example, a director of IT said, "We have a lot of short notice requests, where we have a hole in operations. Instead of saying well, it is going to take us a month to get started. [After deploying Pure Storage,] we ask how quickly the software vendor can deliver because we can be ready the next day." He went on to say that new applications would take "two to three weeks lead time because you had to spec and order the hardware, versus two to three hours [with Pure Storage]." Quantifying some of the personnel savings Pure Storage has delivered, one participant, a director of infrastructure and operations, noted, "Without Pure, I would have definitely needed one or two more people to keep things on the same track."

- **Reduction in dedicated storage management staff:** One participant in the study described the environment prior to deploying Pure Storage, "Managing all those different physical devices, those operating system, upgrades, and the backups; operating expense-wise, those were the biggest headaches." Another participant attempted to quantify the management savings from Pure by saying, "There are other things that guys on the storage team need to be doing versus staring at a screen and trying to figure out how to tweak something, and Pure has really helped that."

In another example, one IT organization was receiving two to three calls per week on application performance issues. When asked to quantify the impact of the performance issues, the manager of storage infrastructure said, "There were between five and ten people looking at [any particular performance issue]. The storage team, we had to look at performance stats, a lot of times we would go in there and we did not see anything out of the ordinary, the DBAs would be looking at stuff, the system admins would be looking at the OS and the hardware, we could never really triangulate and say for certain it was this or that. We had a lot of people involved and a lot of people trying to figure out what was going on, but we never found a smoking gun." In the three years since moving to Pure Storage, his team has not had one performance-related issue.

> "*It never goes down. In healthcare it doesn't get any better than that…We are always providing care, there is never an off day.*"
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> Director of IT, Healthcare

- **Improved uptime and reliability:** During the interviews, ESG noted multiple instances where the Pure Storage provided improved resilience of the system. In one example, a director of IT said, "The most quantifiable benefit from [Pure's] environment is that we are up, those applications are up all the time, they are never down." In another example, a manager of storage infrastructure was impressed with Pure's call home capability, saying "Even when we had issues with Pure, Pure's support was on the phone with us before the on-call guy was out of bed, we don't get that with a lot of the other vendors we work with. It has put us in more of a proactive mode." And one director of IT attempted to summarize the reliability benefit of Pure Storage by saying, "It never goes down, in healthcare it doesn't get any better than that…We are always providing care, there is never an off day."

- **Reduction of the maintenance window requirement:** When maintenance activities were required with Pure's technology, participants described Pure as delivering more than just eliminated downtime. Pure's technology also eliminated any application disruption while dramatically reducing the time the infrastructure was at risk. In one specific example, the Pure Storage systems were able to manage a controller upgrade, which took 30-45 minutes, and caused no downtime or disruption to the data. With the previous solution, a hardware upgrade required a full day to transition the hardware. In another example, one director of IT said, "We have almost zero planned downtime. We can upgrade the storage. We can upgrade a server. If the server is having trouble, we can change the configuration on the fly."

- **Reduction in the budget spent on outside partners to deploy and configure storage:** The benefits from Pure's simplicity extended to the elimination of outside vendor and reseller support. As a director of IT noted, "We were looking for technology flexible enough that we could manage on our own, our legacy hardware required a lot of manufacturer and reseller involvement, [with Pure] we can do what we need to do without involving outside resources. [Our previous vendors and resellers] slow us down, they cost us money, they are in the way, and they make our projects take more time when they are involved."

- **Flexibility to redeploy IT staff to other IT activities designed to grow the business:** The simplicity benefits offered by Pure extend beyond making operations easier to freeing up existing resources to work on new initiatives. In one example, a director of IT said, "We have even more flexibility now, one of our engineers can manage the entire environment, and another can be working on new projects, new technology, or another area." In this example, the director went on to say how this reapplication of existing resources helped speed up a new genomics project without adding costs.

These individual benefits combine to provide an illustration how all-flash technology and Pure Storage can better serve the healthcare industry. Upon reviewing this list, a detractor may argue that deploying any all-flash technology and not necessarily the specific solution from Pure Storage could deliver many of these same benefits. While the performance of all-flash storage definitely delivers advantages, it is important to point out that these examples span beyond just the benefits of all-flash storage and extend to other capabilities specific to Pure. Participants highlighted benefits to manageability, the service and support, Pure's Evergreen Model, and the ability of Pure Storage to drive down the cost of all-flash. In the conversations, it was performance demands that led the IT decision makers to all-flash technology, and it was these other benefits that led them to Pure Storage.

The Bigger Truth

The fundamental theme present in these conversations is transformation. Prior to deploying Pure Storage, these IT decision makers in healthcare were managing infrastructure that was both costly and complex. Incredibly difficult-to-diagnose performance issues were a regular occurrence. New workloads came with an added burden of sizing and deploying more hardware, which added incremental cost and time to each new initiative. This complexity led IT decision makers to turn to outside help, leveraging vendor or third-party resources, which often served to only further increase the cost and time to deploy new projects. With Pure Storage, the IT infrastructure and the organization evolved. New workloads are now deployed faster. Less people are required. Upgrades, changes, fixes, and additions are non-disruptive and nearly immediate.

Pure Storage enabled these healthcare organizations to reduce the cost of their storage infrastructure and reduce the time they spend managing it, while simultaneously enabling new opportunities. As patient populations swell, providers have no reprieve when it comes to patient care. To make matters even more challenging, few industries carry the levels of security and regulatory risk that healthcare does. In other words, the healthcare industry faces significant IT challenges today, and those challenges are poised to get much worse. Addressing these growing concerns with status quo infrastructure is too costly, and unsustainable. It requires transforming the day-to-day IT operations to a streamlined model, freeing up any and all excess resources to address new demands and initiatives without adding costs. Based on the interviews in this paper, Pure Storage has already transformed healthcare data centers, optimizing them to be able to address the challenge of the day-to-day workflow, while enabling organizations to focus on new initiatives. In other words, few industries face the same pressures that the healthcare industry faces, therefore few industries may benefit as much from all-flash technology and Pure Storage as healthcare can.

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