

# White Paper

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## Key Reasons to Use Software-defined Storage—and How to Get Started

*With a Focus on IBM's Capabilities*

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## Introduction and Background

There is broad industry agreement that software-defined storage (SDS) represents an important, promising next step toward helping organizations address the myriad storage and data challenges they face today.<sup>1</sup>

It is ironic that software-defined storage lacks an agreed-upon definition. Typically, though, after IT professionals start delving into what SDS can do for their own organizations, it becomes hard to find anyone who is not intrigued. Naturally, the degree of interest, the expected deployment approaches, and the extent of the benefits anticipated do vary. But a consensus exists that value is to be had from this new approach.

### Storage Challenges Are Being Inadequately Addressed by Traditional Storage

Why do organizations “need” SDS, and why is the IT industry developing it? The cliché that most IT organizations have been experiencing tremendous growth in storage-related demands for capacity, performance, functionality, and flexibility is not only true, but it is also reaching a breaking point with traditional storage approaches. New applications have cropped up that demand big data analytics, mobility, and social platform integration. Initiatives related to various styles and models of cloud computing and even the “Internet of Things” are driving massive data growth, new storage challenges, and new expectations. The only aspect not growing (at least not at a fast-enough clip to keep pace if nothing else changes) is budget.

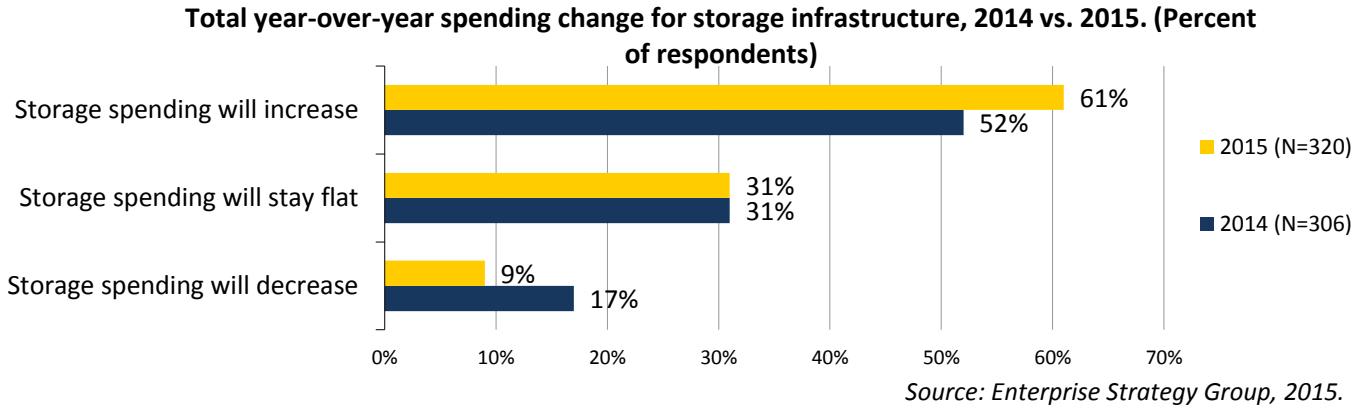
With these changes ongoing, organizations need to be unencumbered by traditional storage and infrastructure-related constraints. They need flexibility. “Traditional storage” is not sustainable enough to overcome contemporary data challenges of scale, integration, and flexibility. Specifically:

- Blindly adding storage capacity ahead of estimated demand cannot go on forever. That approach doesn’t scale linearly, and it can add unnecessary cost and complexity.
- Manually managing across heterogeneous storage systems, silos, and clouds increases administrative overhead. For example, duplicating data across storage pools or geographic locations can create copy-management cost and complexity issues; expanding to the cloud can increase that complexity.

The upshot is that organizations must shift away from the way they have traditionally “done” storage. Figure 1 shows that budgets allocated to storage continue to grow in surveyed organizations.<sup>2</sup> Although growth in capacity demand is a big contributor to the problem, there are mitigating factors, too:

- Declines in the per-capacity raw cost of storage—declines that most organizations are now enjoying.
- Improvements from running more efficient storage infrastructures—although many organizations have not yet achieved (or even attempted to gain) these efficiencies.

Figure 1. Storage Infrastructure Spending Is a Perpetual Concern for IT



<sup>1</sup> This assertion stems from the proliferation of vendor and commentator promotion and discussion, as well as from the results of ESG’s next-generation storage architectures research, which will be published in February 2015.

<sup>2</sup> Source: ESG Research Report, 2015 IT Spending Intentions Survey, to be published in February 2015.

Addressing this situation is imperative. The current storage model is already close to failing, regardless of whether one looks at it from an operational or a financial perspective.

- **Operationally**, older-style storage creaks at the seams when it is asked to be as responsive, flexible, and malleable as today's applications and users demand.
- **Financially**, ESG knows—based on information shared by survey respondents—that cost reduction is an extremely commonly cited business initiative driving technology spending in 2015.<sup>3</sup> Specifically, when ESG asked respondents which considerations they believed would be most important in justifying IT investments to their organization's business management team over the next 12 months, three of the top four most-cited responses mentioned return on investment (ROI), business process improvement, and reduction in OpEx.<sup>4</sup>

The storage ecosystem is at a “something must be done” point. It appears that SDS, even with its multiple styles and definition-related challenges, could be that something.

Additionally, the ability of the broader SDS offerings to embrace the cloud increases the attractiveness of the SDS data management paradigm even further—SDS can provide a way to integrate and leverage the positive aspects of clouds (such as lower costs and higher flexibility) without introducing more convoluted management.

## SDS Is a Broad Concept

SDS is a broad concept, which can lead to confusion. But confusion does not equal a lack of potential value. Although many IT professionals still scoff at the term software-defined storage (calling it vendor hype or marketecture), much of their derision stems from the fact that there is still no universally true, commonly accepted understanding of *what SDS is*.

Trying to provide a one-size-fits-all, forever sacrosanct definition of SDS isn't the best use of one's time. SDS is an umbrella concept. Aiming for too much specificity can hide the general point that SDS isn't going to show up as some numbered part orderable by the pound, gallon, or meter. The only real commonality across everything being draped in the SDS flag is the emphasis on *the value that software brings to the storage arena*.<sup>5</sup> Crafting a standard dictionary definition of SDS will not help move IT organizations forward one bit. A definition does not improve operations, finances, or business outcomes—things that actually matter.

Now, of course, many vendors do have their own SDS definitions. For example, some sell “SDS offerings” that may not be fully baked. Unsurprisingly, those vendors tend to define SDS as precisely what they have to sell. After all, those who have only a hammer define the need for a hammer, and then see only nails.

The hunting around by some for a perfect SDS definition is interesting academically but is of little practical use. What really matters to organizations is:

- **The storage needs of specific users, workloads, and applications.** In this case, “storage needs” relate to factors such as performance, quality of service (QoS), functionality, and budget (not to mention flexibility to cope with changes in the business environment).
- **The extent to which those storage needs can be met or exceeded** by the increasingly capable, software-led storage solutions appearing in the market (and those solutions that existed already but are now being given renewed focus and are adopting the SDS moniker).

Various approaches, capabilities, extents, scalability, and affordability will all continue pouring into the general SDS bucket. Matching the right tools to users' precise needs is where the conversation evolves from being conceptually interesting to *IT compelling*.

<sup>3</sup> Ibid.

<sup>4</sup> The only higher-mentioned initiative was security and risk management. Not surprising; IT security is the “headline of the moment.”

<sup>5</sup> A similar flurry to adopt the cloud mantle occurred a few years ago. That flurry abated as we learned to subsegment the approaches (SaaS, IaaS, etc.) and became more familiar with cloud-related capabilities and choices. ESG expects something similar to happen with SDS.

## The Various Approaches to SDS

Multiple SDS routes and options exist, but it is helpful to understand the main approaches under the software-defined storage umbrella.

First, make no mistake: Storage has been “software-defined” for decades. The only difference was that the industry used to talk only about microcode on controllers rather than software on servers. As vendors moved from ASICs to x86 processors as the foundation for their arrays’ functionality, the move to “SDS” was effectively underway.

The availability of massive processing power and network bandwidth enables true separation of software and physical storage in some manifestations of SDS. And in general, current storage software capabilities—wherever they reside—are *much* greater than just a few years ago.

As mentioned, the fundamental obligation is to meet workloads’ and end-users’ needs. Their needs will determine (1) what type of SDS is optimal, (2) where the SDS software will run, and (3) how broad the software’s functionality will be. SDS subcategories (which can be considered separately or in combination) encompass:

- Storage virtualization.
- Management and monitoring.
- Orchestration.
- Full software-derived storage functionality.

Each of these might be tied to a particular vendor’s product or even to an open source stack, and each might operate with heterogeneous or commodity hardware.

Where does this software sit? Any or all of it might be in a storage system, provided as a server application, or delivered with the actual operating system or hypervisor. And these options could be onsite or in a cloud. The SDS range extends from the epitome of heterogeneity and agnosticism to a simple vendor-packaged route that provides more operational flexibility and better control for generalist IT admins. The range of options should be a source of satisfaction to well-prepared IT professionals: Choice makes it easier to find an SDS tool that will be the key to unlocking the latent operational and financial values in a given storage environment.

## How to Balance SDS Options

So how do you even begin to narrow down the options? Begin by considering:

- **Operational needs:** Although easier said than done, try to ignore glitzy marketing and semantics in favor of determining what you really need to achieve—not only outcomes, but also priorities and budgets today and in the coming years. Focus on pragmatic needs, not on acquiring the latest “shiny IT object.” Your vision will point you to which attributes of an SDS solution are the ones you should seek.

For example, if your problem is lots of boxes on the floor, and you need to add even more boxes to support new applications, then a storage virtualization solution (such as [IBM’s SVC](#)) may be appropriate. On the other hand, if you have lots of unstructured data growth and plan to deploy new applications (maybe collecting data from the “Internet of Things,” etc.), then something like IBM’s Spectrum Scale might be better at handling the range, scale, and accessibility of that data.

- **Vendor attributes:** Given the range of specific needs and implementation choices, it’s smart to look for a vendor with more than one “SDS hammer” because you don’t want your IT operation to become an unwitting or inappropriate “nail.” Storage is an area of IT that looks easy to the uninitiated but is always challenging in reality. And the increasing virtualization and consolidation of modern processing platforms makes storage even more of a pressured environment: The more data you put on a system, the more inherent risk rises. Thus, in an SDS world, the hardware (commodity or not) actually can be seen to be *more* crucial.

Also, many organizations are seeking to embrace public cloud computing options to leverage the cloud’s lower costs and an ability to turn resources on and off (for example, getting some storage for a finite

project and dropping it when done). A good SDS solution for them is one that includes the public cloud as one of the types of storage under management—that public cloud can fulfill expectations for lower cost and more ease, rather than making things worse to manage and thus more expensive.

A vendor offering a broad range of SDS capabilities and possibly hardware as needed, along with credibility from field-proven SDS offerings, will likely have a better chance of meeting your specific needs. IBM is clearly a vendor fitting this mold. It has a broad range of hardware in addition to a choice of SDS offerings.

And importantly, IBM's software-defined storage is not release 1.0. Rather, it is the latest iteration of a range of interoperable *enterprise-proven* tools. Some renaming and evolutionary improvements to the existing base products did happen, but the basic ability to “do” what we now know as SDS has existed at IBM for many years. (Good examples include the GPFS software that underpins IBM's Spectrum Scale offering, and IBM's highly successful SVC virtualization engine that has long been able to apply storage functionality and management across disparate storage devices from multiple vendors.)<sup>6</sup>

### Do You Already Have Parts of an SDS Architecture in Place? Almost Certainly

It is not just IBM that has pieces of the puzzle available already. You have elements of an overall SDS architecture in place, even though you may not think of them that way. Of course, not many IT departments want to throw out everything and start from scratch—even if operationally desirable, that step is unlikely to be financially attractive. The better SDS offerings let you choose your physical storage on merit (allowing heterogeneity and agnosticism to be the cornerstones of optimized platform choice), and they accommodate and integrate into the infrastructure you already have.

SDS (at least from vendors such as IBM) can thus be seen as a wholesome incremental advance rather than a wholesale infrastructure alteration.

### SDS Is Desirable ... and Desired

**Desirable:** The benefits of SDS, such as elasticity and the potential to economically map desired storage functionality to specific workloads dynamically (on-premises or in a public/private cloud), are high on IT managers' storage wish lists. Other notable potential benefits of SDS can include the following. They are all aspects for potential SDS purchasers to consider, understand, and put on their decision-criteria list:

- **Centralized, easier control:** This is the result of one system, with a consistent interface, to manage more—or all—storage. The key characteristics of a well-implemented software-defined infrastructure (especially flexibility and ease of change) make SDS an ideal foundational element of a private cloud.
- **Scale:** While basically all solutions can grow, advanced SDS offerings such as IBM's Spectrum Scale can put that ability on “IT steroids”—making them not only large and scalable, but also geo-dispersed and integratable into cloud environments.
- **Heterogeneity:** Many SDS tools will manage a heterogeneous environment, thus removing the constraints of such elements as data locations, data types, applications, or storage types. SDS is like “one magic pool of data,” as one IT decision maker told ESG.<sup>7</sup>
- **Economy:** SDS software can reduce costs. Each time an organization buys traditional storage, it pays for both the hardware and the associated proprietary management software. By making a single, logical software investment to manage all storage hardware, an organization can reduce both its OpEx and CapEx. And with the economies of scale that SDS brings, storage/system administrators can invariably manage orders of magnitude more data than before, as well as achieve better resource utilization.

<sup>6</sup> Note: While some mentions of IBM's specific abilities are made here, this paper is intended to be a prescriptive “how to get started” piece that applies generally to users who are uncertain of the efficacy of SDS or confused/concerned about what it really is. Further details on IBM capabilities can be found on IBM's website, and they will also be covered in a forthcoming ESG white paper.

<sup>7</sup> Source: ESG Research Report, *Next-generation Storage Architectures*, to be published in February 2015.

## Getting Started with Optimized SDS Adoption

Like the cloud's emergence a few years back, the problem is not that software-defined storage doesn't mean anything. It's that it means too much. Many vendors, with varying approaches and abilities, have with some justification laid claim to some of software-defined storage's luster. And frankly, most have at least some potential value.

The *only* starting point for any IT user considering SDS is to be clear on needs—specifically, operational and financial needs, not the “need” to deploy SDS because it is the latest trendy thing. As mentioned, SDS is not a specific thing but rather is a conceptual approach with multiple vendor implementations.

In much the same way that real estate agents proclaim that choosing a house is all about “location, location, location,” any SDS investigation is all about “needs, needs, needs.” Starting with the better SDS offerings will *not* involve throwing out and replacing everything you already have. IBM, for instance, isn’t trying to sell some “magic SDS in a box.” It is trying to help organizations build out and up from where they are today.

Again, if your organization is like most, it probably has some elements of SDS (or at least infrastructure that can play well in an SDS sandbox) that could be part of an “official” SDS implementation. Aim to get started on that official implementation by speaking with vendors who can:

- Meet the various operational and budgetary needs you have.
- Embrace what you already have installed.
- Manage physical storage of as many types, in as many locations including the cloud, as you want.
- Be relied upon to deliver future enhancements.
- Provide credibility and proven expertise, including support.

## The Bigger Truth

Although some fatigue already exists among IT managers who hear vendors applying the term “software-defined” to almost anything, those decision makers should *not* be concerned about SDS conceptually. Indeed many of them may well be engaged in some level of SDS already; it is just a matter of how and to what degree. As organizations look to extend SDS adoption, they should know that the better solutions (such as those from IBM) will not demand they go out on a limb. SDS can be a *revolutionary* solution in terms of its impact on IT operations and economics, but it can and should also be one that organizations can implement in a measured, *evolutionary* manner.

To get started and succeed, most organizations don’t really want excessive choice. Rather, they want and should seek a solution that matches their precise requirements and offers sufficient flexibility in terms of implementation, future development, and efficient reuse of the assets they already have. Beyond the functional aspects, it is good to consider the provider: Look for extensive proof of both capability and expertise, along with a deep understanding of both software and physical storage.

IBM’s experience in storage technologies is enabling it to build SDS solutions that meet today’s requirements for flexibility, cloud readiness, analytics, content management, and database management. SDS may be a “new” concept to many IT professionals, but for IBM it is a deep-rooted capability.

**DESIRED:** According to new ESG research on next-generation storage architectures, the term “SDS” prompted direct interest from only about 45% of respondents. However, when the potential *impact and operational/financial value* of SDS was discussed, the respondents’ interest in SDS became close to universal. Most of them especially appreciated SDS’s potential in the areas of flexibility, cost, scalability, functionality, and management ease.



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