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Economic Value Validation: Tintri

Quantifying the Value of Tintri VM-aware All-Flash and Hybrid Storage Arrays
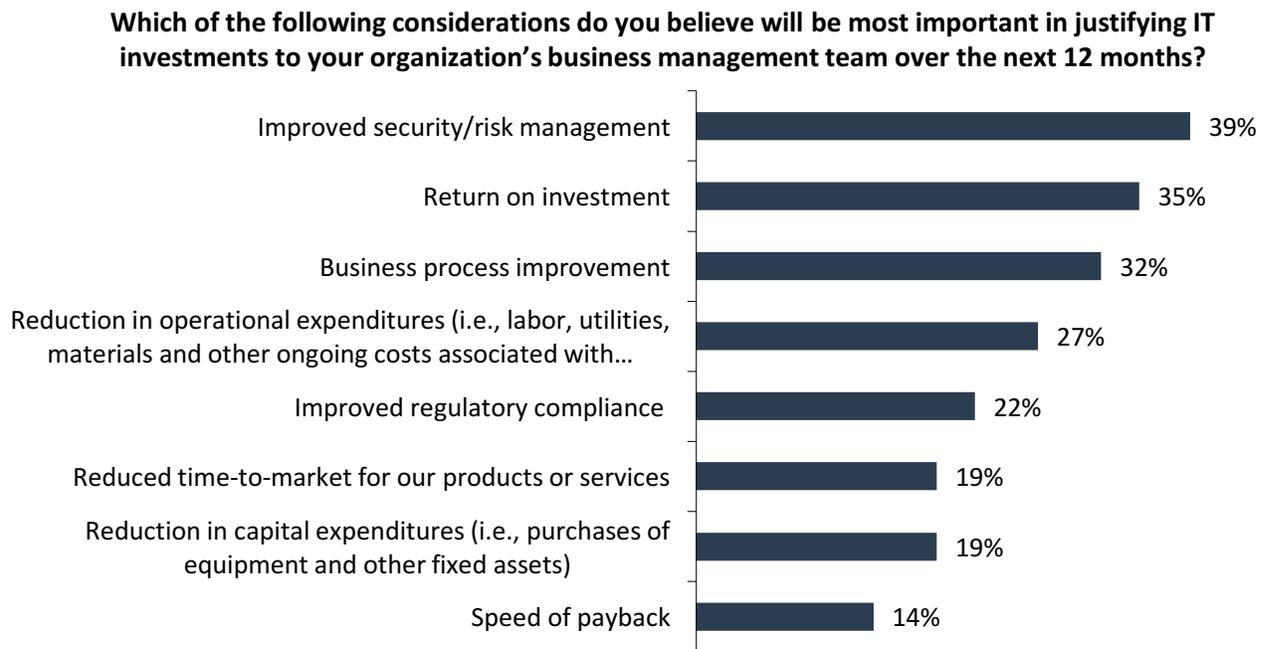
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Challenges

While it was once a technology that was approached with concern and caution, virtualized infrastructures have proven themselves convenient and capable of delivering mission critical applications and services. Hypervisors such as VMware ESXi, Microsoft Hyper-V, Red Hat Enterprise Virtualization, OpenStack, and Citrix XenServer have come a long way, ultimately earning the trust of enterprise organizations while delivering significant improvements in operational efficiencies. While virtualization has certainly made dealing with servers and networking easier and more cost effective for administrators, traditional LUN-based storage arrays were simply not designed for virtualized environments. LUN-based storage represents the last blockade to delivering a truly end-to-end virtualized infrastructure, adding unnecessary cost and complexity to your virtualized IT environment.

As shown in Figure 1, ESG Research indicates that after improving security and risk management, return on investment (ROI) is the most important consideration in justifying IT investments to the organization, followed by business process improvements and reduction in operational expenditures.[1] It is clear that businesses have a close eye on costs, and are looking to make smarter investments, not just less costly ones.

Figure 1. Most Important Considerations in Justifying IT Investments

Which of the following considerations do you believe will be most important in justifying IT investments to your organization's business management team over the next 12 months?

Improved security/risk management	39%
Return on investment	35%
Business process improvement	32%
Reduction in operational expenditures (i.e., labor, utilities, materials and other ongoing costs associated with…	27%
Improved regulatory compliance	22%
Reduced time-to-market for our products or services	19%
Reduction in capital expenditures (i.e., purchases of equipment and other fixed assets)	19%
Speed of payback	14%

Source: Enterprise Strategy Group, 2016

To effectively evaluate storage for highly virtualized environments, it is essential to first understand not only the capital and operational costs related to the storage investment, but also the benefits that this storage investment can enable in other areas of the business. While organizations are beginning to comprehend the strong justification of a higher price tag for all-flash or hybrid storage arrays, they would be well advised to better understand how even these seemingly advanced storage technologies may be built upon legacy storage concepts that are not ideal for virtualized environments.

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[1] Source: *ESG Research Report: 2016 IT Spending Intentions Survey*, February 2016.

The Solution: Tintri VM-aware Storage (VAS)

Tintri VM-aware Storage was designed to provide high-performance storage for highly virtualized and cloud environments. Tintri datastores eliminate the need to create, manage, map, and monitor LUNs, plan and configure RAID groups or volume striping, etc. Tintri storage arrays are available in the VMstore T5000 all-flash models and the VMstore T800 hybrid models (flash and HDD). Tintri storage can be easily scaled out by adding more storage arrays in a loosely-coupled federated pool, and support advanced features that are common in today's all-flash and hybrid arrays, including features like thin provisioning, in-line deduplication and compression, instant snapshot and restore capability, and quality of service to name a few. Virtual machines can be directly stored and managed on space-efficient Tintri datastores, enabling virtualization administrators to handle storage tasks without esoteric storage training.

Tintri's hands-off, automated policies greatly simplify storage administration with VM-level quality of service (QoS) and insight. This helps to guarantee high performance without overprovisioning storage, as well as simplifying troubleshooting and issue resolution across the virtualized environment. Seven of the Fortune 15 companies trust Tintri storage for their highly virtualized environments consisting of virtual machines, virtual desktops, databases, and DevOps. Some of the key benefits of Tintri VM-aware Storage are shown in Figure 2.

Figure 2. Tintri VM-aware Storage Array versus Traditional LUN-based Storage Array
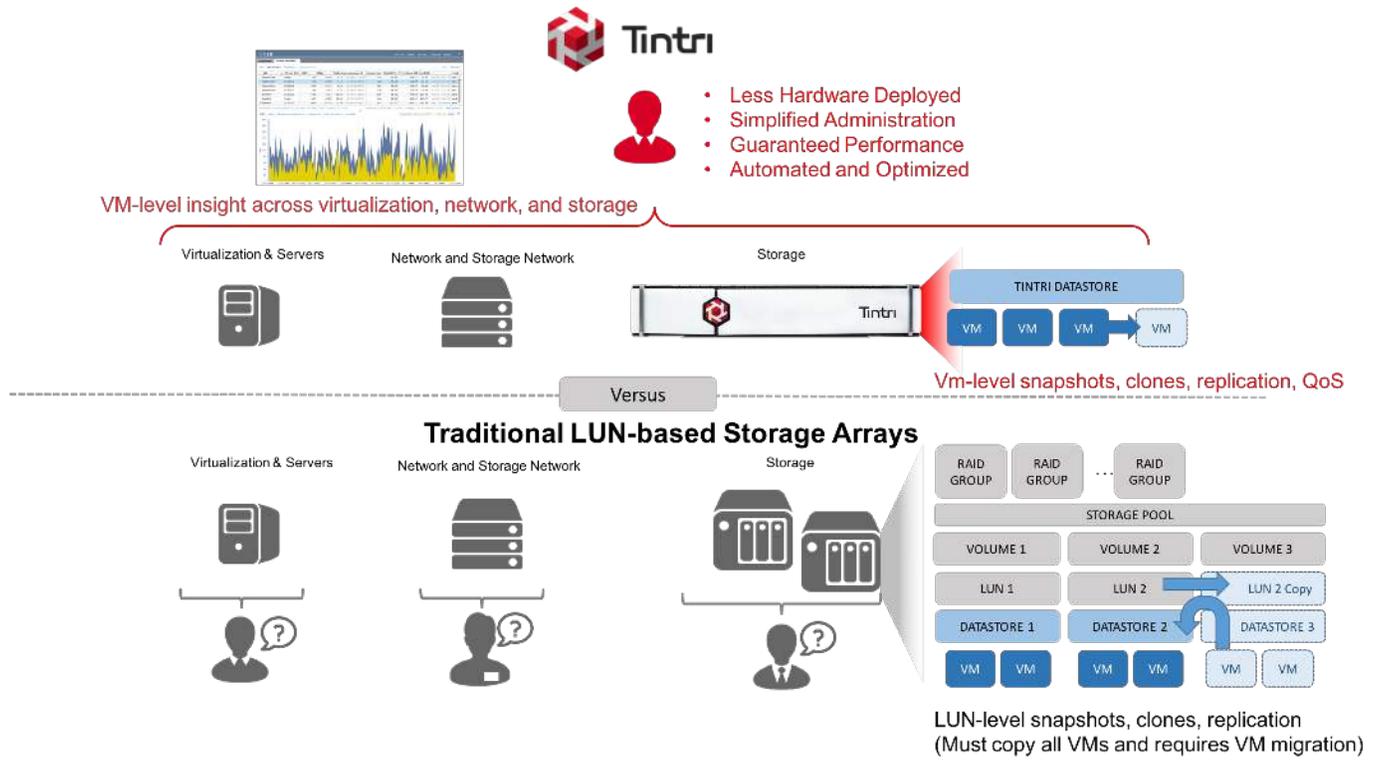
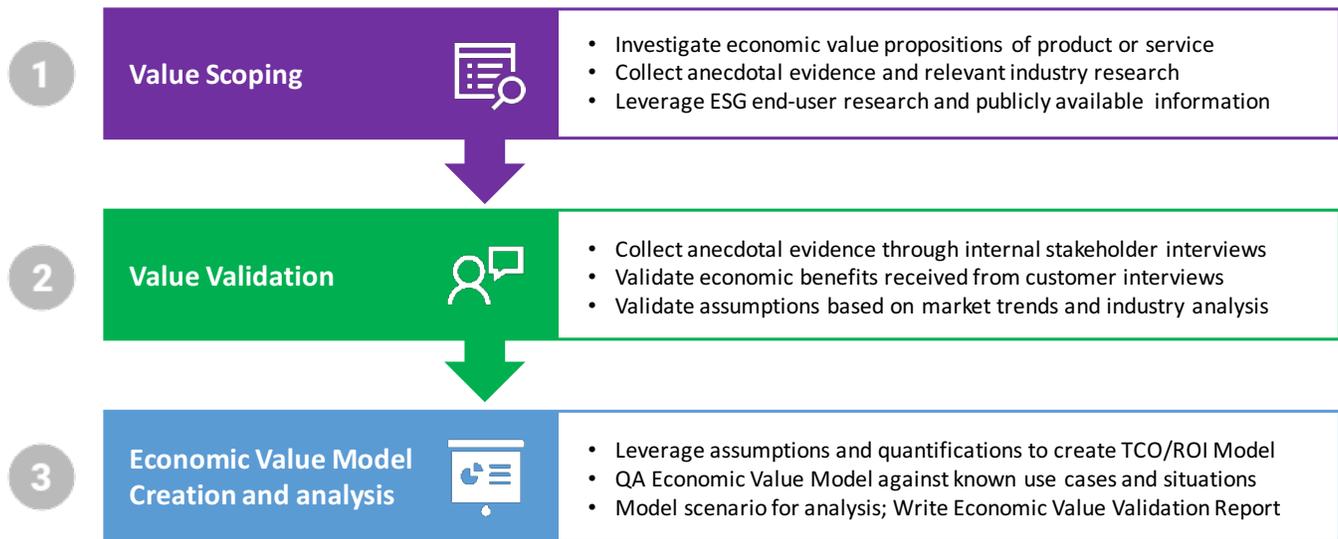*Source: Enterprise Strategy Group, 2016*

Economic Value Validation (EVV) Process

ESG's Economic Value Validation process is a proven method for understanding, validating, quantifying, and modeling the economic value propositions of a product or solution. The process leverages ESG's core competencies in market and industry analysis, forward-looking research, and technical/economic validation. The EVV process consists of four main phases: Value scoping, validation, quantification, and model development.

In the value scoping phase, ESG works with a vendor's internal stakeholders to discuss the ways in which the product or solution can impact potential customers. These economic benefits may be in the form of cost savings (lower CapEx or OpEx), cost avoidance (e.g., reducing compliance risk, eliminating the need for professional services) increased revenue (e.g., faster task completion, ability to handle more desktops), and other soft benefits (e.g., increased user productivity, higher customer satisfaction). In the value validation phase, ESG conducts in-depth interviews with end-users to better understand and quantify how these potential value propositions have impacted their organizations, particularly in comparison to previously deployed and/or experienced solutions.

In the final stages, ESG blends the quantified values revealed through the stakeholder and customer interviews with known industry values and additional research, resulting in a validated set of assumptions on which to build a scalable and dynamic TCO/ROI model. This Economic Value Model (EVM) accepts as inputs the answers to typical qualifying questions regarding a potential customer's IT environment and business needs. The model then returns a detailed report of expected savings, TCO, and ROI over a given time period when compared to a relevant, defined present mode of operation (PMO). An overview of the ESG Economic Value Validation process is shown in Figure 3.

Figure 3. ESG's Economic Value Validation Process

1 Value Scoping
- Investigate economic value propositions of product or service
- Collect anecdotal evidence and relevant industry research
- Leverage ESG end-user research and publicly available information

2 Value Validation
- Collect anecdotal evidence through internal stakeholder interviews
- Validate economic benefits received from customer interviews
- Validate assumptions based on market trends and industry analysis

3 Economic Value Model Creation and analysis
- Leverage assumptions and quantifications to create TCO/ROI Model
- QA Economic Value Model against known use cases and situations
- Model scenario for analysis; Write Economic Value Validation Report

Source: Enterprise Strategy Group, 2016

Economic Value Overview

Tintri VM-aware Storage was designed specifically for virtualization and cloud environments, and ESG's Economic Value Validation process revealed that Tintri VM-aware storage arrays can provide significant cost savings and economic benefit opportunities. ESG Lab found that Tintri can help organizations in three primary areas: By reducing costs related to traditional storage TCO, by better integrating with virtualized environments to simplify daily administration, and by providing greater insight into daily operations and potential issues.

ESG validated Tintri's economic value propositions through a series of customer interviews with a variety of highly virtualized organizations that had deployed Tintri VAS. These organizations covered a range of industries including online gaming, software development, and biopharmaceuticals; deployments ranged from small organizations with up to three Tintri arrays to large organizations with 20 or more Tintri arrays at multiple locations around the globe.

These customers revealed how Tintri VM-aware Storage had helped them reduce storage-related TCO in numerous ways, including:

Traditional Storage Cost Savings

- Lower cost of acquisition vs. LUN-based traditional all-flash and hybrid storage arrays

- Less capacity to purchase due to inline deduplication and compression

- On T800 hybrid arrays, higher levels of performance supported versus other hybrid arrays due to intelligent use of flash media

- No need to overprovision storage due to reliance on traditional LUNs and RAID groups

- Scale-out architecture makes planning and scaling virtualized environments simple

- Ability to intelligently consolidate workloads without impacting each other with automatic always-on QoS

- Less hardware to deploy, manage, maintain, and support

- Reduced lower power/cooling/floor space costs

One organization said:

"In 4U of space, the Tintri solution offered better performance for the same capacity that the other vendor's solution did in 17U, at half the cost."

But a fast and easy storage array is of little value if the array is not reliable. Many Tintri customers were thrilled with the fact that they spent far less time replacing failed drives. One customer even said:

"After replacing our previous solution where we have often had to replace failed drives, the Tintri solution has been bulletproof. We had a thermal issue where we measured over 112 degrees in the cold aisle. The Tintri reported the high temperature but did not shut down or fail, and we did not even lose a drive."

ESG also learned that one of Tintri VAS's major advantages was that daily operations were far simpler to administer than their previous storage experiences. Every customer with whom we spoke shared the sentiment that with Tintri they simply "set it and forget it." Organizations spent very little time managing the Tintri array, and most claimed that they needed less than one hour per week to manage, monitor, and maintain their storage environment. One customer reported:

"We used to have a team of four storage admins doing various tasks across multiple interfaces. Once we switched to Tintri we were able to free up the admins to work on other tasks. Tintri maybe requires one person at most for less than an hour a day."

The ability to spend less time managing storage means that organizations can significantly reduce the operational costs of managing their storage environment, freeing up IT personnel to focus on other areas of the business, and greatly reducing the amount of time spent troubleshooting and resolving performance and capacity issues. Some of

the ways that Tintri VAS had reduced operational expenses related to managing, monitoring, and maintaining storage were:

VM-aware Storage Administration Savings

- No need to manage LUNs and RAID Groups

- No need to partition arrays or create new LUNs to support multiple concurrent hypervisors

- Simple and easy integration of storage directly into a hypervisor datastore

- Storage can easily be managed by virtualization administrator and does not require storage training

- No need to migrate workloads or VMs between tiers or arrays to manage performance

- Automated policies help to guarantee the performance of virtualized workloads (QoS)

- Automated policies help simplify backup and data protection

- Far easier to plan, grow, and shrink VM-aware datastores

- Less coordination required between management silos (virtualization, server, storage admins)

- Easier to monitor with greater VM-level insight into performance and capacity of individual VMs

Another organization reported:

"It is much easier to solve problems on the Tintri with their VM-level insight. It's much easier to monitor and report than our previous legacy storage systems which required coordinating the results obtained through three separate interfaces."

This ability to identify, troubleshoot, and solve problems more quickly extends the economic benefits from simple management cost savings, to making end-users more productive by spending less time dealing with application issues. A few often overlooked areas in which Tintri helped to save their customers money include:

Other Benefits and Savings

- Lower cost of installation (fewer professional services, internal planning, and admin time)

- Quicker time of deployment with faster time to business value

- Fewer trouble tickets and faster resolution means increased productivity for end users

- Insight into individual latencies of storage, network, and compute to resolve issues faster

- Low, predictable application latency helps keep end users more productive and satisfied

While these benefits are dependent on the size and type of business, one customer reported:

"We were able to deploy, provision, and perform proof-of-concept testing on the Tintri array in a day. The other array from a well-known storage vendor took weeks and included a team from professional services."

Economic Modelling

ESG's Tintri VM-aware Storage Economic Value Model

ESG leveraged the information collected through vendor-provided material, public and industry knowledge of economics and technologies, and the results of customer interviews to create a three-year TCO/ROI model that compares the costs and benefits of deploying a Tintri VM-aware storage array versus a defined present-mode-of-operation. The model allows for a choice of an all-flash (T5000) or hybrid (T800) Tintri deployment to be compared with a choice of three traditional deployments: a LUN-based traditional storage architecture consisting of flash and

spinning media; a LUN-based, next-generation hybrid storage array; or a LUN-based, next-generation all-flash storage array.

The model considered the necessary requirements for running consolidated VDI, database, and general server virtualization workloads that are defined by parameters such as the number of users/desktops, capacity, performance, and expected growth. These requirements were used to size both the Tintri and present mode of operation (PMO) configuration. The model calculated and reported the difference between the Tintri and PMO configurations for storage TCO CapEx and OpEx (cost of acquisition, power/cooling/floor space, support/maintenance, administration) as well as additional economic benefits derived from advantages resulting in improved user and IT productivity and faster time-to-value.

It should be noted that the data and conclusions presented in this report reflect the output of ESG's economic value analysis based on the specific use cases and assumptions modeled for this report. ESG acknowledges that changes to these assumptions will lead to a different set of results, and therefore advises IT professionals to use this report as one validation point in a comprehensive financial analysis prior to making a purchase decision.

Pricing assumptions for Tintri products were provided by Tintri. Other IT equipment and labor cost assumptions were obtained from publicly available sources such as IT vendor websites and published price lists. ESG acknowledges that list prices, configuration details, or other data used as inputs may vary depending on information sources.

Example: Using the EVM to Predict Savings for a Modeled Organization

To illustrate the economic advantage of a Tintri VM-aware Storage versus a traditional storage deployment, ESG ran a set of assumptions through the ESG Economic Value Model. One scenario modeled a mid-market organization with 2,000 employees deploying new storage (or refreshing their traditional storage deployment) to consolidate IT operations that are critical to a business that currently generates $50M in annual revenue. The requirements for the VMs, performance, and capacity are discussed in detail in the following paragraphs and summarized below in Figure 4.

Figure 4. VM, IOPS, and Capacity Requirements for the Modeled Organization
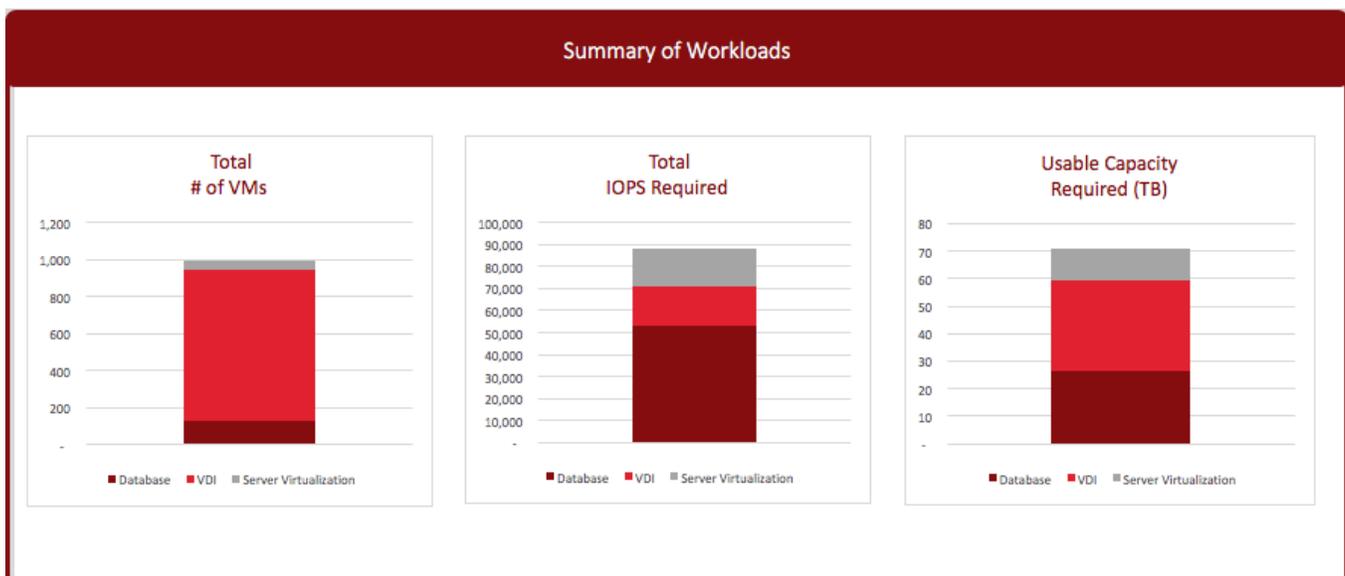
ESG assumed that this organization's virtualization environment consisted of mission-critical and non-mission-critical databases, a virtualized desktop environment for 800 employees, and several other applications and services running on VMs. ESG assumed that three large databases were being accessed by up to 100 virtualized servers and 2,000 users at any point in time. These databases and virtual machines required 20TB of usable capacity and up to 40,000 IOPS to handle "bursty" workloads at peak times of operation. The user community, capacity, and IOPS requirements were all expected to grow by 10% annually.

The VDI requirements consisted of a single VDI desktop for up to 800 employees. Each desktop required 30GB of storage and performed a moderate workload averaging 20 IOPS. The total number of desktops was expected to grow by five annually, with a 10% capacity growth and a near-flat 3% IOPS requirements. Finally, the organization maintained 40 other virtualized server applications and services that required a total of up to 15,000 IOPS and 10TB of total storage, with each requirement growing at 5% annually. These applications and services provided access for up to 5,000 users (employees, partners, customers, and web users) that was expected to grow at 10% annually.

With this information entered, the ESG EVM calculated that by deploying a single Tintri T5000 VM-aware, all-flash storage array instead of another next-generation, LUN-centric, all-flash storage array, the modeled organization could expect total savings and benefits of around $284K over a three-year period. These savings result in an expected ROI of 196% with a payback period of 12 months. A summary of the modeled results is shown in Figure 5.

Figure 5. Summary of Modeled Scenario Results returned by ESG Economic Value Model

Of the roughly $284K in expected savings and benefits, roughly $232K is expected as a result of traditional storage CapEx and OpEx savings. ESG's economic model predicts 54% lower cost of acquisition and 79% lower cost of warranty and maintenance. This difference would be vendor- and configuration-specific, and in this case the competitive products analyzed were minimally configured. Acquisition and support cost savings would be even greater when comparing hybrid or traditional storage arrays with a more robust configuration designed for higher performance. The TCO results from the EVM modeled scenario are shown in Figure 6.

**Figure 6. Summary of Storage Related TCO Savings**
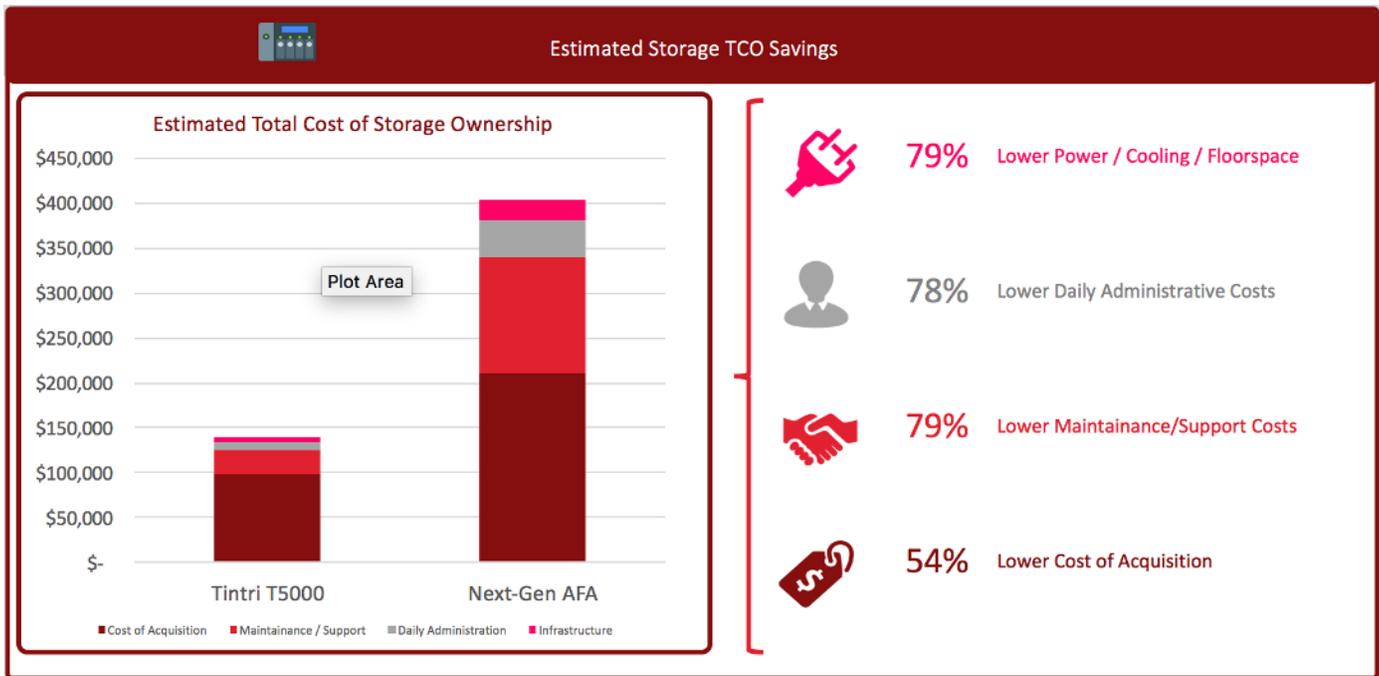
The Tintri solution provided total up-front capital expenditures that were 63% lower, while at the same time providing 74% lower OpEx spread out over three years. This lower operational expense consisted of lower infrastructure and management costs, as well as 74% lower power/cooling/floor space costs when compared with the traditional array that requires more hardware. The Tintri storage array is easier to manage on a daily basis since there is no need to create, manage, map, and migrate LUNs and/or RAID groups. Not only is less management effort required, but also the Tintri array could be managed by a general purpose virtualization administrator. ESG's EVM predicted that the modeled organization would enjoy a 78% lower cost of daily administration.

ESG's model also predicted additional economic benefits that may not at first be apparent. Because Tintri provides VM-level storage insight, it is much easier to monitor and troubleshoot potential performance issues without the need for collaboration among VMware, network, and storage administrators. With Tintri, a single administrator can quickly be alerted to any potential issues, identify the problem VMs, and resolve issues in minutes. This means that end users can expect to spend less time dealing with support issues, and IT administrators can expect to spend less time and effort resolving them. ESG's model estimates that the 31% less time dealing with support, 60% less time monitoring storage, 86% lower cost of deployment, and increased time-to-value could deliver an additional $51K of economic benefits over three years. These results from the EVM are shown in Figure 7.

Figure 7. Additional Estimated Economic Benefits Expected from Tintri Deployment
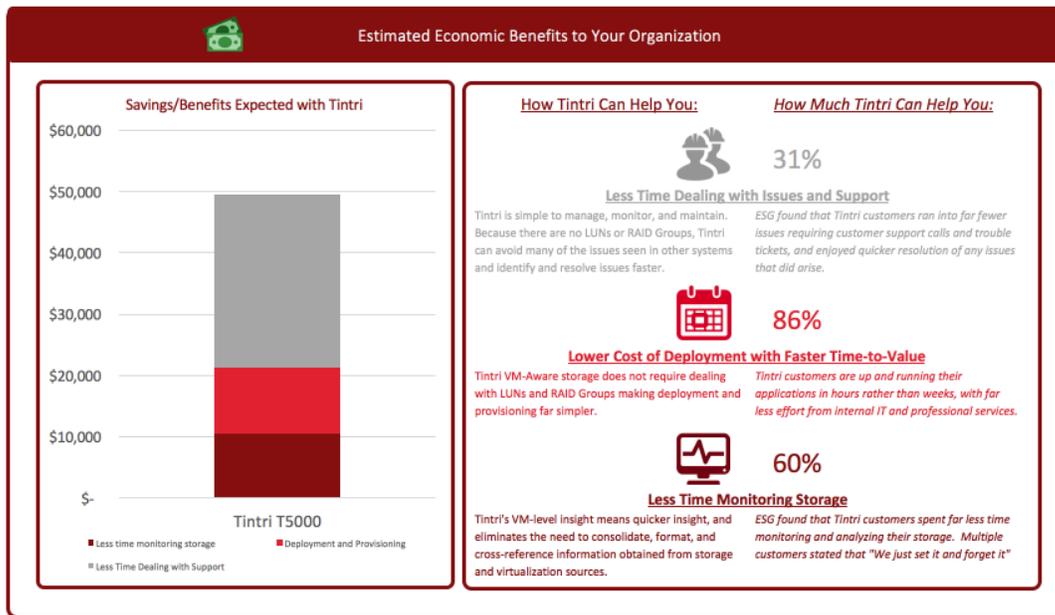
Source: Enterprise Strategy Group, 2016

Finally, ESG's EVM model provided some insight into other key storage purchasing metrics. While many organizations typically consider only the $/GB provided by a storage solution, caution is advised. $/GB will fluctuate greatly depending on how capacity and cost are defined: for example, usable vs. used vs. raw capacity, or cost of acquisition only vs. all costs. ESG's model calculated the usable capacity $/GB as a function of all three-year CapEx and OpEx related costs to be $1.69/GB for the Tintri solution and $2.42/GB for the LUN-based all-flash solution. A potentially more useful metric is the storage and management cost for each VM in an organization. The EVM calculated that the Tintri T5000 would provide the modeled organization with VMs at a cost of $138/VM while the cost on the LUN-based all-flash array would be $386/VM (nearly 3X more). The EVM model also calculated that a single Tintri administrator could easily manage all 770TB of storage, whereas the LUN-based all-flash array would require a second administrator after only 300TB. It should be noted that ESG's interviews revealed that in some circumstances, a single Tintri administrator could easily manage over 4PB of storage! The key metrics summary for the modeled organization are summarized in Figure 8.

Figure 8. Key Metrics Summary for ESG's 3-Year Modeled Analysis
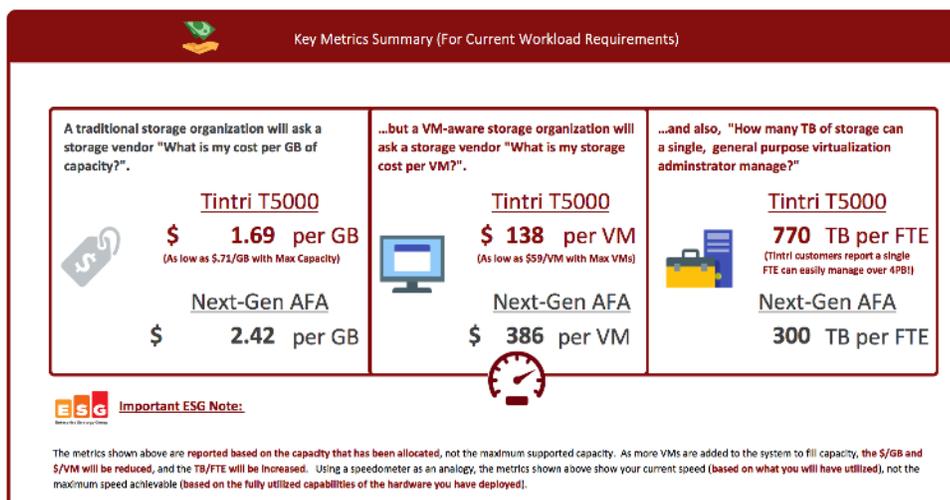
Source: Enterprise Strategy Group, 2016

The Bigger Truth

Server virtualization has conquered initial skepticism around performance and reliability and has been proven to deliver more agile and cost effective IT operations. While the server and network have become increasing easier to manage and maintain, even the latest next-gen hybrid and all-flash storage arrays are built around legacy LUN-based architectures that add unnecessary cost and complexity to the virtualized environment. Tintri VM-aware Storage was designed to provide highly virtualized IT organizations with next-generation storage arrays that eliminate this extra cost and complexity, while extending the value of virtualization across the entire IT infrastructure.

Like any good product, Tintri has a well-defined target market. It was designed as VM-aware Storage for virtualized environments; it was not designed to compete against traditional storage arrays in SAN deployments with bare metal server installations. This helped Tintri focus its design on making virtualized storage easier, more cost-effective, and more efficient. Tintri was designed to compete against, and take advantage of, the design limitations of the LUN-centric approach of traditional, all-flash, and hybrid storage arrays. The end result is simplified storage for virtualized environments that is easier to deploy, manage, monitor, and maintain. While the technology certainly makes great sense, any smart organization must ask if the many benefits are worth the investment.

ESG's Economic Value Validation process was used to investigate and validate the ways in which Tintri VM-aware Storage can help reduce capital and operational expenses when compared to traditional LUN-based storage arrays including the latest next-gen hybrid and all-flash storage systems. The detailed results are articulated throughout this paper, but at a high level, ESG validated that over a three-year period Tintri VM-aware Storage can provide an organization with a fast and easy-to-use storage array with a lower up-front capital investment (cost of acquisition, maintenance/support) , and lower monthly operational expenses (power/cooling/floor space, administration costs) – even when compared to next-gen hybrid and all-flash arrays. Tintri users we spoke with all shared the same sentiment of the "*set it, and forget it*" experience, meaning that the built-in automation and VM-level QoS just works, enabling them to spend far less time managing and troubleshooting the array.

But perhaps more important, ESG found that Tintri storage arrays enabled organizations to realize benefits in other areas of the business that may not be as apparent. The end-to-end VM-level insight made troubleshooting and monitoring the storage system far simpler for organizations, ultimately saving both their IT resources and users valuable time, resulting in increased productivity. And because the Tintri array can be installed, tested, and deployed faster than traditional storage systems, the investment offered a faster time-to-value. While the operational benefits of Tintri-VM-aware Storage used in virtualized infrastructure often justify the investment in the technology by itself, it is good to know that the value of Tintri can extend beyond the datacenter.

If your business is looking to make sound financial investments and is ready to deploy storage that was purpose-built to extend the benefits of virtualization across the datacenter, ask your Tintri rep to run your custom scenario through the ESG EVM to see just how much value Tintri can bring to your organization.

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