Economic Value Validation

Quantifying the Value of VersaStack, a Converged Infrastructure Solution by IBM and Cisco

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Executive Summary

Analysis Highlights, Typical Enterprise Use Case with VersaStack:

- Modeled 293% return on investment
- Estimated ~4-month payback period
- Nearly $2.4M in incremental business benefits enabled over three years with a 33% reduction in costs

ESG was engaged by IBM and Cisco to conduct an Economic Value Validation, including the development of a detailed economic model, to quantify the value of the jointly-developed VersaStack integrated infrastructure platform. The analysis is designed to help IT organizations determine the fully-burdened costs and benefits of leveraging this pre-validated infrastructure stack against a "present mode of operation" (PMO) that reflects traditional component-based data center infrastructure intended to support virtual environments. This analysis builds upon ESG's evaluation of VersaStack, in-depth interviews with technical stakeholders at IBM and Cisco, ESG's general familiarity with the adoption drivers and perceived advantages of converged infrastructure, and, most importantly in-depth interviews with real-world VersaStack users. This analysis is designed to provide prospective customers with a comprehensive picture of the potential direct and indirect cost and benefit drivers they should consider when evaluating an investment in VersaStack.

As discussed in the following pages, VersaStack offers the opportunity for customers to increase their IT and user productivity, while significantly improving application time to value compared to piece-part infrastructure approaches. Moreover, differentiated features of the IBM storage and Cisco networking and server components allow customers to achieve material TCO improvements. **In fact, ESG's analysis of a typical use case for VersaStack results in an impressive 293% ROI and a brief ~4-month payback period.** Traditional approaches to infrastructure virtualization that ESG modeled resulted in a significantly lower ROI as a result of significantly lower expected benefit and higher anticipated costs. For organizations struggling to overcome IT operational challenges tied to infrastructure complexity, embracing the automation and intelligence offered by modern integrated platforms can prove invaluable. Pre-engineered computing solutions that are faster to deploy and easier to manage, that automatically react to change, and that deliver highly reliable applications for end-users, as shown in ESG's analysis, can have a significant impact on the financial success of potential customer organizations.

Market Overview

Building out traditional data center infrastructure stacks is difficult. It requires IT to work with many different vendors present in the stack when designing the infrastructure, to create and maintain complex compatibility matrices, and it requires a high level of design competency to ensure that the resulting pieced together infrastructure can support user requirements. Moreover, once deployed, managing the complicated mashup of technology solutions is difficult. Each component may have its own management consoles and administrative tools to learn and interact with. When issues arise, vendors present in the infrastructure are quick to point the finger at the other components as the root cause, making diagnosis and remediation frustrating and time consuming for IT.

Converged Infrastructure Momentum:

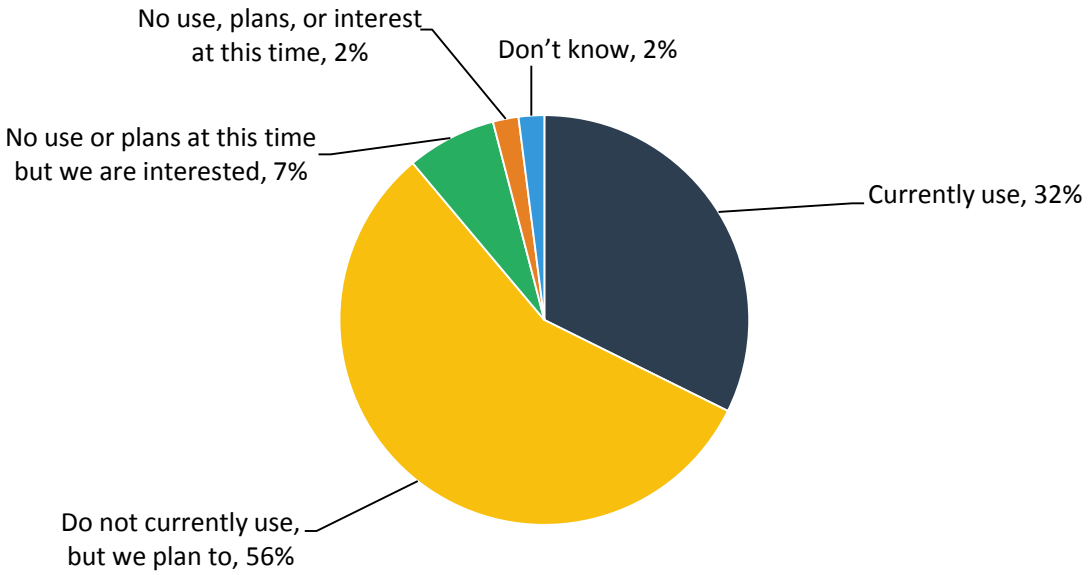
- 32% of organizations have deployed converged infrastructure
- 56% of organizations plan to deploy converged infrastructure

While this traditional approach has been the status quo for decades, a recent trend in IT is for organizations to move towards converged infrastructure, which is made up of pre-engineered and tested infrastructure stacks delivered by a limited number of vendors. These systems are designed, balanced, and validated to work with specific application workloads and delivered in a single chassis. Although a relatively recent trend, converged infrastructure has gained serious momentum. In recent ESG research among IT decision makers, ESG queried respondents about their deployment of converged infrastructure.

As seen in Figure 1[1], nearly one-third (32%) of respondents reported their organization had already deployed converged infrastructure solutions with an additional 56% indicating plans for the technology.

Figure 1. Usage of Converged Infrastructure Platforms

Please indicate your organization's usage of or plans for converged infrastructure technology solutions. (Percent of respondents, N=308)



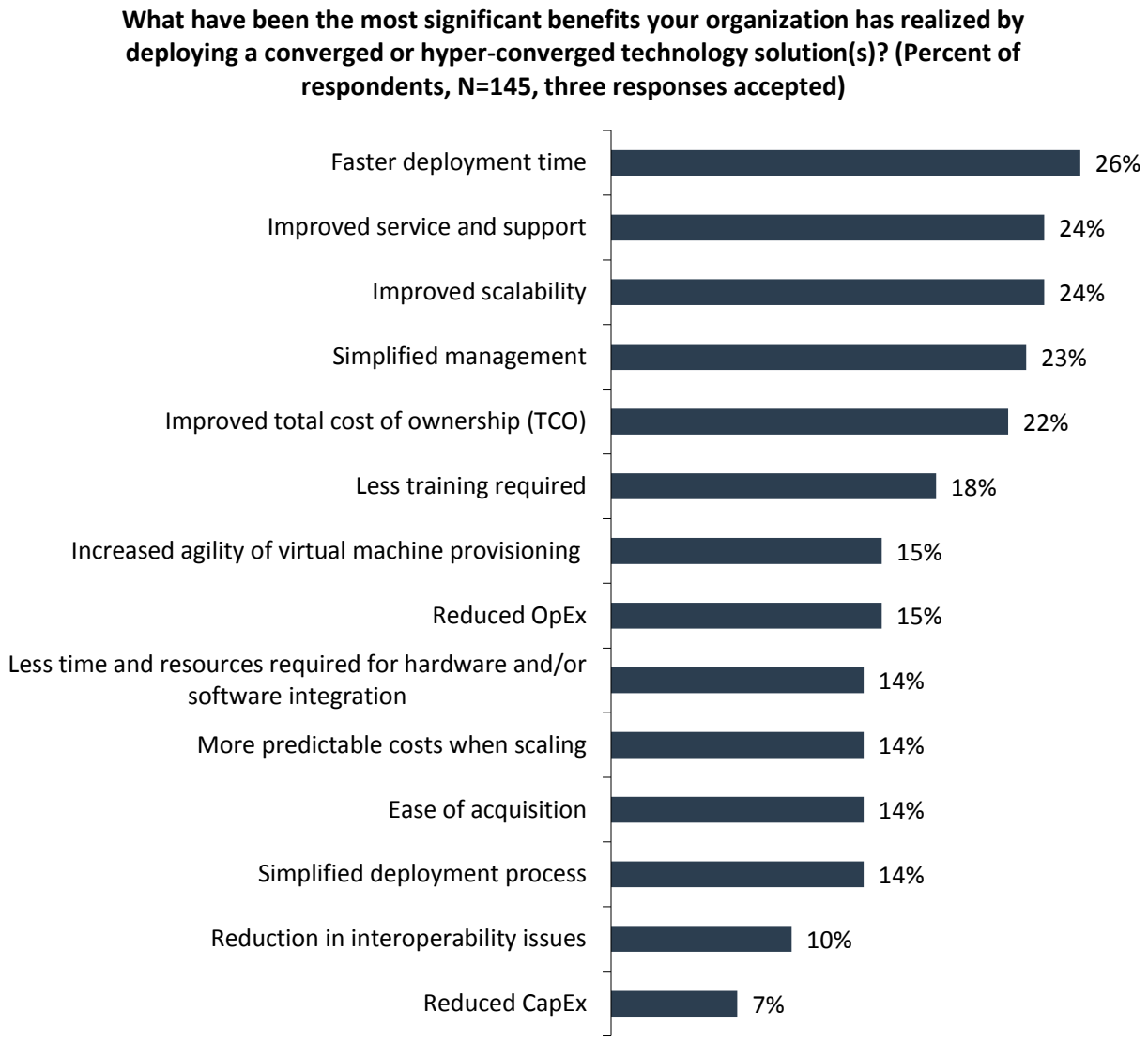
Source: Enterprise Strategy Group, 2016.

As any CIO can attest, getting budget approval for a new technology project can be a challenge. Within most organizations, IT is viewed as a cost center and budgets face significant scrutiny. However, the broad adoption and plans for converged infrastructure show that CIOs are having success selling those solutions up the management chain for approval. ESG research data indicates one reason that may be the case is that converged infrastructure solutions offer a compelling cost and benefit profile. The expected return on investment of a technology project was listed as the second most frequently cited response for the most important factor in gaining budget approval for new initiatives, with a 35% response rate. Additionally, investment in new technologies that offer improved ROI was also cited as the second most common way IT organizations were attempting to reduce or contain IT expenditures, with a 30% respondent incidence.[2]

Indeed this anecdotal link between adoption and a favorable cost-benefit ratio is backed up by what actual converged infrastructure users report about their experience with deployed converged solutions. Faster time to deployment (26%), improved service and support (24%), simplified management (23%), and improved total cost of ownership (22%) were all among the top five most frequently cited benefits associated with converged infrastructure (see Figure 2).[3] In turn, each of these benefits materially impact either the cost side of the equation, the benefit side of the equation, or both when evaluating the ROI of an IT investment.

[1] Source: ESG Research Report, *The Cloud Computing Spectrum, from Private to Hybrid*, March 2016.
[2] Source: ESG Research Report, *2016 IT Spending intentions Survey*, February 2016.
[3] Source: ESG Research Report, *The Cloud Computing Spectrum, from Private to Hybrid*, March 2016.

Figure 2. Key Achieved Benefits of Converged Computing Platforms



Source: Enterprise Strategy Group, 2016.

IBM and Cisco have been partnering on VersaStack, a converged infrastructure solution marrying Cisco servers, networking, and management capabilities with IBM storage solutions, since late 2014. In fact, ESG has previously validated technical aspects of the VersaStack solution as recently as December of 2015.[4] As experienced vendors in the converged infrastructure space, they are keenly aware of the potential benefits these solutions can deliver to end-users. The remainder of this paper discusses the process undertaken by ESG to build an economic model to quantify these benefits with the intention of helping prospective customers understand the true economic impact of investing in VersaStack solutions compared to more traditional infrastructure approaches.

[4] Lab Validation Report, *VersaStack Converged Infrastructure from Cisco and IBM*, December 2015.

VersaStack Infrastructure: Qualitative Examples of Customer Benefits

As discussed, Cisco and IBM aim to deliver a converged infrastructure platform which allows customers to achieve benefits to multiple constituents: IT organizations responsible for building and maintaining the infrastructure and end-users reliant on the infrastructure.

Key Customer Benefits Summary:

- Simplicity of Architecture
- Decreased Time to Production
- Increased Reliability and Automation
- Improved Focus on User Experience

First, the solution should make IT's life easier by offloading significant upfront system design and architecture tasks. Additionally, ongoing management should be eased via comprehensive administrative tools like UCS Director which allow the infrastructure to be managed cohesively. Additionally, differentiated features of the components in the infrastructure like IBM Real-time Compression and Cisco's SingleConnect network fabric help reduce costs expected in traditional data center builds by reducing costs associated with storage capacity and switching and cabling respectively.

For end-users, being supported by an infrastructure solution that takes less time to deploy and once deployed is more reliable, agile, and automated introduces numerous and significant productivity improvements and allows them to capitalize on reduced application time to value.

Clearly these differentiators should have a number of positive economic implications for organizations. However, to accurately and defensibly quantify these benefits, real-world experiences must be gathered, vetted, and interpreted. To accomplish this goal, ESG interviewed current VersaStack customers to better understand their usage of, and the benefits associated with, the platform in order to inform and validate the assumptions used in ESG's EVV modeling. Based on these interviews, ESG concludes that the benefits of deploying VersaStack compared to traditional data center approaches are substantial. ESG's findings with respect to customer benefits are presented quantitatively in the EVV scenario analysis discussed in this report, but they are also summarized qualitatively—in the customers' own words—in this section.

Simplicity of Architecture

The hypothesis that deploying a single pre-validated, more tightly integrated design offers many advantages over a traditional piecemeal data center was referenced by multiple customers with whom ESG spoke. The result was that the VersaStack converged solution provided them with the ability to stand up and scale the infrastructure without the need to scale IT effort commensurately:

Customer insights:

"The main goal with VersaStack was to get to a single-vendor support model for infrastructure, both physical and logical… It needed to be simple, we were trying to maintain or even reduce IT headcount as we grew."

"Traditional infrastructure comes in pieces… some hardware, software, OS and other components. VersaStack comes in a single piece, which is much simpler than before."

Decreased Time to Production

VersaStack customers reported that the simplicity of the platform brought with it agility: the ability to deploy the solution significantly faster than with alternative DIY approaches. The financial implications of this benefit are two-fold. First less manpower is required on IT's behalf to design and implement the stack. Second, workloads deployed, which may carry with them tangible benefit in terms of their ability to generate revenue were in production sooner. The result is lower labor cost needed to generate more revenue for the organization.

Customer insights:

"If we did DIY or component-based infrastructure, we would have had to spend a lot of time architecting pieces, like network high availability, for example. I estimate this additional design work would have added 3-4 quarters of additional calendar time versus. 1 quarter with VersaStack."

"We were able to deploy VersaStack in 2-4 weeks. If we had to design and build it ourselves, we would have been looking at multiple months. Up front, we would have needed somewhere between two to four times work and time."

Increased Reliability and Automation

However, benefits were not reported to end at the design and implementation stage of the infrastructure project. Significant steady-state benefits were reported by customers when they considered the operational expense of managing their infrastructure, whether those benefits arose from UCS Director acting as a consolidated monitoring console for the system or with a multitude of different monitoring tools throughout the stack:

Customer insights:

"The biggest pain point we had was piecemeal, multi-vendor, administration interfaces, now we manage infrastructure through a single pane of glass."

"With VersaStack we can spend more time on higher level initiatives versus manual tasks. We save significant OpEx on monitoring. When we look at staff capabilities and bandwidth, the investment pays off tenfold."

Additionally, customers reported benefitting from the ability to actually shorten specific infrastructure management workflows, from deploying VMs in a more automated fashion with no risk of administrator error, through restoring a VM from a backup or copy, to applying firmware patches and upgrades without fear of disrupting the infrastructure components' compatibility:

Customer insights:

"We can spin up a new VM, running Microsoft Server 2012 R2, in under 3 minutes, not from an image. Images take just a few seconds from a template."

"One key benefit of VersaStack is that it has allowed us to mitigate the pain associated with fallbacks. We use SQL in an always-on nature and have had to do a few fallbacks. Failover with VersaStack is less than three seconds. It used to take us, best case, 30 minutes and as much as a day."

"Staff OpEx is a critical thing for us. Agility, firmware upgrades, maintenance, etc. We don't track most of these workflows individually, but we think what used to take our admins 8-10 hours a week is down to 1-2 hours per week."

In the aggregate, the result is that customers reported significant improvements in the ability for time-strapped administrators to manage their infrastructure:

Customer insights:

"We estimated that we would need as much as 5x the people to support our environment. We needed 5-10 staff previously and with VersaStack we only need two."

Improved Focus on User Experience

By freeing limited IT resources from the tactical task of "keeping the lights on," there was a reported increase in the ability to focus on the end-user—responding to business requirements and designing applications that allow application users to be more efficient and productive. This was a tangential, but still very important, benefit of leveraging a converged solution like VersaStack.

Customer insight:

"With VersaStack, we've freed up IT to focus on better database and application design, instead of mundane infrastructure management tasks. This has led us to be able to deliver a better client

These insights are just a sampling of the benefits VersaStack customers reported to ESG. The remainder of this paper discusses the process of quantifying these benefits in ESG's Economic Value Model and discusses the model outputs for a hypothetical scenario.

Economic Value Model Overview

Methodology

The research and modeling methodology ESG adhered to in its EVV analysis of VersaStack is articulated in Appendix A.

Model Scenarios

As articulated in Appendix A, ESG's economic value analysis compares two scenarios: The first is an organization that elects to use the VersaStack platform to support its virtual compute infrastructure requirements. The second scenario is a 'present mode of operation' or PMO that reflects a more conventional "component-based" approach that most customers currently take to meet their virtual infrastructure requirements. The basic profiles for each scenario follow:

- **VersaStack scenario:** In this scenario, the customer is using VersaStack—specifically a build with IBM Storwize V7000 and UCS standard—a reference architecture that combines Cisco UCS servers, networking, and systems-management capabilities (delivered by UCS Director) with IBM storage systems and that is delivered in a single chassis. ESG's model takes into account the purchase price of the system components, maintenance costs, and related IT labor costs for planning, ordering, implementing, administering the system, and training.
- **PMO scenario**: In this scenario, the customer is using a comparable set of hardware and software components that are selected, installed, and configured manually by a systems integrator on the customer's premises. ESG's analysis assumes that the customer is using blade servers and SAN storage, and that the configuration will be clustered using 10 GB Ethernet switches and networking interfaces for server interconnects within the cluster, for SAN storage, and for external access to the servers. ESG

also assumed redundant network switches and interconnects for high availability. ESG's model takes into account all hardware, software, and data center infrastructure costs associated with this solution, plus related IT labor costs for planning, ordering, implementing, ongoing environment administration, and training.

For both scenarios, ESG modeled the costs and IT savings benefits associated with the following tasks:

- Planning and architecture/design tasks required to scope the solution and prepare for deployment
- Deployment tasks including initial installation and setup, plus periodic upgrades and ongoing maintenance activities

Simply put: ESG's analysis estimates the likely cost and potential benefits of implementing and managing—according to the tasks considered—both a VersaStack platform and a comparable component-based infrastructure solution.

- IT administration tasks such as provisioning and configuring new virtual servers and applications
- IT administration tasks related to storage and network installation, configuration, provisioning, and management
- Change management tasks performed as new software is added to virtual servers, and existing software applications are upgraded
- Ongoing systems management activities performed by the system and personnel for monitoring system activity, taking actions, and reporting on system status

ESG's model considers both the current infrastructure needs and the expected growth of the environment over three years to size the configuration of the solutions considered at the outset of the three-year time horizon.

Cost Categories

This ESG analysis considers six cost categories: hardware, software, infrastructure, maintenance and support, professional services, and staff costs. The sum of these categories equals the total cost of ownership (TCO) of each solution.

Benefit Categories

This ESG analysis considers three primary benefit categories: IT operations improvements, user productivity improvements, and application time to value improvements delivered by the infrastructure solution selected. The sum of these categories equals the total benefit of each of the given infrastructure approaches.

Default Scenario

ESG developed a baseline profile of a hypothetical enterprise to illustrate the relative costs and benefits of utilizing VersaStack compared with the PMO discussed in this report. For the purposes of this analysis, ESG tuned its assumptions to be representative of a growing, enterprise-sized virtual environment consisting of 250 virtual machines at the outset of the time horizon, growing by 75 VMs annually over the three-year time horizon.

To model the impact of different virtual infrastructure solutions on application environments, and ultimately, end-users, ESG also uses inputs related to the application profile of the hypothetical enterprise to calculate the number of end-users potentially affected by administrative and application availability events. ESG's model allows for three tiers of application workloads: heavy workloads—accounting for 10% of total application mix, moderate workloads—accounting for 40% of the application mix, and light workloads—accounting for the final 50% of the application mix.

At a high level, heavy workloads are intended to represent resource-intensive applications with two CPU cores and more than 150 IOPS allocated per VM. Moreover, it is assumed on average that eight VMs will be allocated per application to support this tier of workload. On average, this tier of application is assumed to support 150

concurrent users per application. The moderate tier of workloads is characterized by VMs with one CPU core and 50-100 IOPS allocated. Additionally, it is assumed that this tier of application has an average of four VMs dedicated to each application. On average, this tier of application is assumed to support 50 concurrent users per application. Finally, light application workloads are characterized by VMs with .25 physical CPU cores and <50 IOPS allocated to them with applications and VMs existing in a 1-to-1 relationship. On average, this tier of application is assumed to support 10 concurrent users per application. In total, effectively 150 applications supporting ~19,000 users are assumed to be supported by the 475 VMs present in the environment at the end of the three-year time horizon.

The monthly application value for this portfolio of applications is assumed to be equal to $500,000. For the purposes of this analysis, this application value figure includes revenue implications associated with being able to deploy applications on the infrastructure more quickly with VersaStack compared with the PMO. This means that for every month an organization can reduce its time to deployment, an economic benefit of $500,000 is recognized. This assumption is important as these implications vary widely from organization to organization and for many organizations this assumption may be conservative.

These and other key assumptions used in ESG's default scenario are summarized in Table 1.

Table 1. Key Default Scenario Assumptions for Typical Enterprise Use Case

Parameter	Default Assumption
Initial number of VMs at deployment	250
Annual growth of VMs	75
Assumed percent of applications that meet heavy/moderate/light workload profile	10% / 40% / 50%
Typical number of concurrent users for applications meeting heavy/moderate/light workload profiles	150 / 50 / 10
Average number of VMs allocated to application that meet heavy/moderate/light workload profile	5 / 2 / 1
Number of VMs per CPU core for VMs supporting applications meeting heavy/moderate/light workload profiles	.5 / 1 / 4
Number of VMs per application typically supporting heavy/moderate/light workloads	8 / 4 /1
Average amount of storage per VM	100 GB
Average compression achieved via IBM Real-time Compression with VersaStack	30%
Wastage factor representing overprovisioning of cabling, data center infrastructure in PMO as compared to VersaStack with SingleConnect	75% higher than with VersaStack
Average monthly value of applications supported	$500,000
Average annual burdened cost – typical IT administrator	US$80,000
Average annual burdened cost – typical employee (application user)	US$65,000
Time horizon of analysis	3 years

Source: Enterprise Strategy Group, 2016.

Summary of Results

With the model parameters tuned to the default assumptions in Table 1, ESG's analysis concludes that the net benefits of implementing VersaStack to support a broad portfolio of enterprise applications greatly outweigh the associated costs. Table 2 shows the modeled return on investment (ROI), project payback period, net present value

(NPV), annual total cost of ownership (TCO), and annual benefit over the three-year time horizon compared with a similarly sized component-based alternative. The following sections detail the most compelling findings from this analysis as they relate to both the costs and benefits associated with VersaStack and how they differ from traditional infrastructure approaches.

Table 2. Economic Value Summary, VersaStack versus the PMO

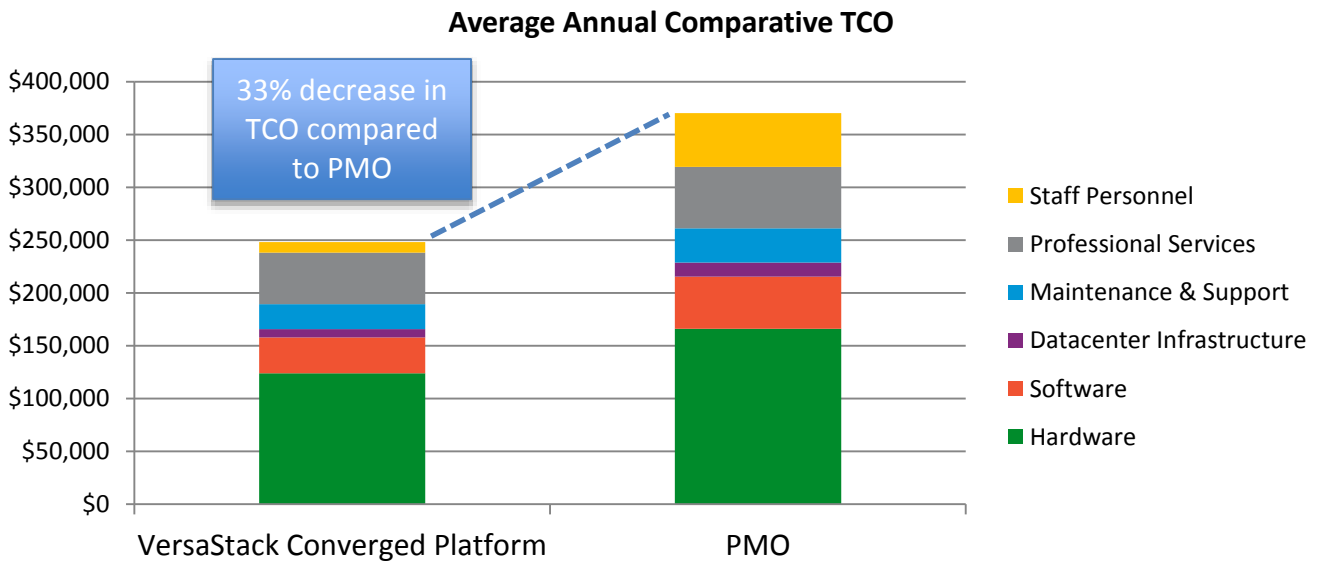
Scenario	Project ROI	Payback Period (years)	Net Present Value (NPV)	Annual TCO	Annual Benefit
VersaStack	293%	.35	$1,012,660	$248,307	$976,304
PMO	-52%	5+	($519,909)	$370,361	$178,358

Source: Enterprise Strategy Group, 2016.

Annual TCO

Annual TCO is the sum of all the cost categories included in the analysis averaged over three years. As displayed in Table 2, the annual TCO for VersaStack is estimated as $248,307, a material 33% savings compared to the PMO. However, TCO should be only one part of the customer consideration when weighing available infrastructure approaches. As shown in Table 2—and discussed in this report section—the lower costs associated with VersaStack are augmented by significant benefits in the area(s) of increased IT efficiency, improved user productivity, and improved application time to value.

Figure 3. Annual TCO, VersaStack versus the PMO

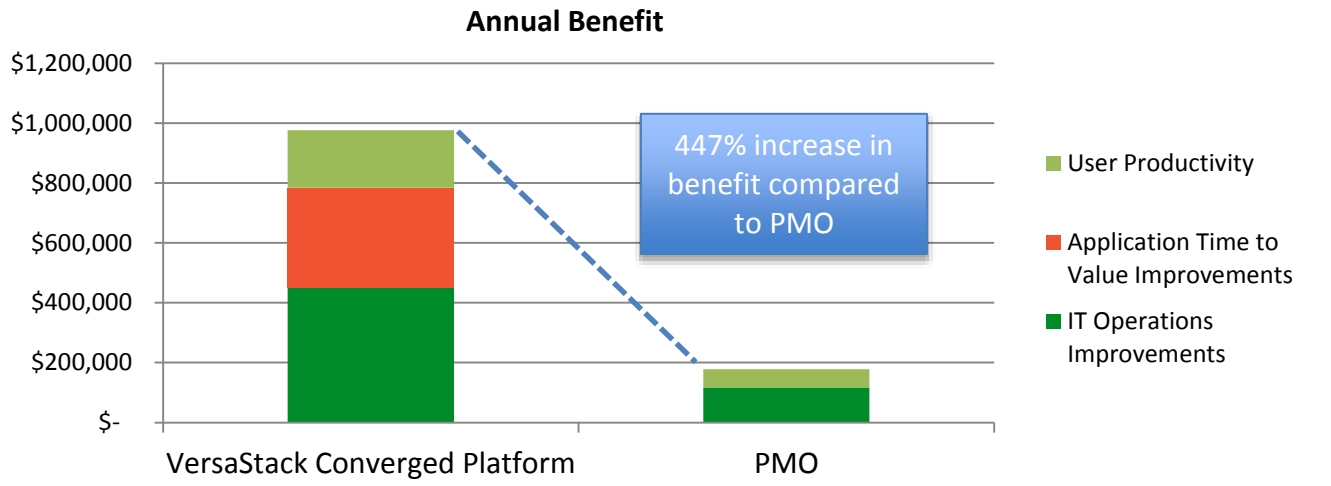


Source: Enterprise Strategy Group, 2016.

Annual Benefit

Annual benefit is the sum of all the estimated benefit categories included in this analysis averaged over three years. As displayed in Table 2, the annual benefit associated with VersaStack is estimated as $976,304, compared with $178,358 for the PMO.

Figure 4. Annual Benefit, VersaStack versus the PMO



Source: Enterprise Strategy Group, 2016.

ROI

Key Economic Outcomes Expected:

ROI: 293%

Payback Period: ~4 months

Net Present Value: >$1M

ROI is a profitability ratio for investments. It is calculated by dividing the net benefits of an investment (i.e., the total benefits minus the associated costs) by the total cost of the investment. A positive ROI indicates that total benefits exceed the costs of the investment. As displayed in Table 2, the modeled ROI for VersaStack in a use case represented by the inputs defined in Table 1 is 293%, which is a significantly higher ROI than is estimated for the PMO. In fact, the PMO's negative ROI represents the view held by many organizations that IT is a cost center for the organization and does not deliver benefit in excess of cost.

Payback Period

Payback period is an estimate of when customers will start to see a positive return from the infrastructure solution they select; it measures benefits achieved over time and costs incurred over time and indicates the investment's break-even point. As displayed in Table 2, the expected payback period for a VersaStack deployment in an environment described by the inputs in Table 1 is .35 years or just over 4 months.

Net Present Value (NPV)

NPV is a measure which calculates the difference between the present value of cash returns and the present value of cash outflows associated with a project. It assumes a discount rate of 15% to calculate the present value of future returns. This metric is commonly used in accounting organizations to evaluate projects. Initiatives with positive NPVs are generally considered to be worthwhile investments. As displayed in Table 2, the modeled NPV for VersaStack using the inputs defined in Table 1 is in excess of $1M (as opposed to the negative NPV calculated for the PMO).

Benefits Analysis

Potential customers evaluating modes of infrastructure deployment must be cognizant of the benefits—in this analysis, broken down into IT efficiency savings, user productivity improvements, and application time to value improvements—they will achieve from the approach selected. The three-year itemized benefits for VersaStack

compared with the PMO alternative ESG developed are displayed in Table 3. As shown, total benefits for VersaStack (estimated as $2,928,913) are modeled as significantly higher than that of the PMO (estimated as $535,073).

Table 3. Three-year Benefits, VersaStack versus the PMO

Category	VersaStack	PMO	Percent Improvement with VersaStack
IT efficiency savings	$1,350,626	$350,855	284%
Initial System Design, Integration, Deployment, and Configuration	*$198,948*	*$41,510*	*379%*
Systems Maintenance, Support, and Management	*$542,081*	*$211,669*	*156%*
Resource Management Including Storage and Network Management	*$318,229*	*$39,635*	*703%*
VM Administration	*$291,367*	*$58,040*	*402%*
User productivity improvements	$578,287	$184,218	214%
Application Deployment	*$104,117*	*$52,273*	*99%*
Application Support/Management	*$205,664*	*$69,103*	*198%*
Application Availability	*$268,506*	*$62,842*	*327%*
Application time to value improvements	$333,333	$0	N/A
Total three-year benefits	**$2,928,913**	**$535,073**	**447%**

Source: Enterprise Strategy Group, 2016.

Major Benefit Differences for VersaStack versus the Built-by-customer PMO

Benefits were calculated based on observations and estimates related to VersaStack obtained through in-depth interviews ESG conducted with real-world customers. Relevant product demos, literature reviews, and in-depth interviews with technical stakeholders at IBM and Cisco were also leveraged.

Key Incremental IT Benefits:

Aggregate IT efficiency improvement equal to 9 FTEs over three years driven by:

- Pre-validation easing deployment and architecture
- Easier operation and management over time and fewer server configuration errors
- Fewer and faster storage tuning and network administration workflows
- More automated VM provisioning

ESG's model uses the fully burdened annual salary of IT workers (assumed as equal to $112,000 on average), along with the differentials in workflows and their frequency, to quantify the financial value of IT efficiency improvements for the organization. In total, VersaStack is estimated to enable a financial improvement in IT efficiency equivalent to 9 IT FTEs over the three-year time horizon for the use case examined in this report. Key IT efficiency benefit assumptions ESG leveraged in its economic value model, which differentiate VersaStack from the PMO, include:

- **Initial System Design, Integration, Deployment, and Configuration:** In a component-based IT infrastructure, the burden of solution design and integration falls on the IT organization and its selected systems integrators. With VersaStack—and enabled by validated designs—much of the planning, system balancing, and rigorous pre-testing for various workloads resides with Cisco's and IBM's engineering resources. This advantage dramatically decrease the deployment time and effort for the customer's IT organization.

  To capture and quantify this difference, by default, ESG's model assumes eight hours of IT staff time will be dedicated to architecture and planning operations in a VersaStack use case scenario compared to in excess of 50 hours in the PMO scenario. Actual IT staff time dedicated to system deployment in the VersaStack deployment is modeled to require only six hours of IT staff time compared to the PMO's 50. Additionally, ESG's model assumes material differences in the time and effort required to set up the management tools for the infrastructure. With VersaStack, Cisco UCS Director is the locus of control for the entire stack. As such, ESG's model assumes about a one hour set up and configuration process. Considering a piece-part infrastructure stack consisting of potentially many vendors' products, each with their own native management tools, ESG's model assumes a much more labor-intensive 20 hours of management tool setup and configuration tasks.

  Each of these project tasks, in addition to marginal assumed improvements in the assumed time to apply regular platform firmware updates (60 minutes per assumed biannual update with VersaStack versus 8 hours per major update with the PMO) and storage configurations (10 minutes to configure storage for each virtual server added to the environment over time versus 1 hour) are the major contributors to the incremental $157,438 in IT efficiency estimated for the VersaStack scenario compared to the PMO.

- **Systems Maintenance, Support, and Management:** Beyond the setup and configuration efficiencies associated with VersaStack, which are weighted towards the beginning of the time horizon, a number of IT efficiencies are created over time. Leveraging a pre-validated architecture compared to completely custom solutions is estimated in ESG's model to ease the ability to add physical servers to the platform over time as requirements change, reduce the number of server configuration errors and reworking, and reduce the number of support calls to the partner or vendor providing support (versus potentially several more vendors) over time.

  To account for the fact that in the VersaStack scenario, physical server additions are assumed to be much simpler operations, while each physical server is modeled to require 60 minutes of IT staff time to deploy in the VersaStack scenario, several man-hours are assumed to be allocated to each physical server addition in the PMO scenario.

  Similarly, server configuration errors—and the difficulty to resolve them—are modeled to be dramatically reduced in the VersaStack scenario. For each physical server added to the environment over time, ESG's model assumes that 10% will require some degree of rework. However, to capture the facts that this frequency may in fact be lower and issues will certainly be easier to resolve in the VersaStack scenario, the average resolution time in the VersaStack scenario is assumed to be 30 minutes versus several working days—essentially equivalent to a redeployment—in the PMO scenario.

  Finally, reflecting the fact that, in the VersaStack scenario, customers have a consolidated number of vendors in place to contact in the event that something goes wrong, ESG's model assumes that customers will spend less time working with their vendors and partners to resolve issues compared to the PMO. In the PMO scenario, a customer, or their VAR, may need to reach out to many different vendors, each of which may shift the responsibility of problem resolution on to other vendors in the stack. To account for this difference, ESG's model assumes a 25% increase in the number of support calls made by IT in the PMO scenario versus VersaStack annually (5 versus 6.25) and assumes a 1.5 hour increase in IT efficiency related to issue resolution (6 hours per call versus 7.5) in the VersaStack scenario.

These workflows, and their respective hourly IT labor cost per-workflow, are the major drivers behind the incremental $330,412 of incremental IT efficiency observed for the VersaStack scenario compared to the PMO in this area.

- **Resource (Storage and Network) Management:** Although the configuration and provisioning of storage for VMs over time is accounted for in the "initial system design, integration, deployment, and configuration" IT efficiency line item, there are many physical storage and networking administration tasks modeled in the environment over time which are eased and improved thanks to VersaStack's ability to manage infrastructure holistically, via UCS Director, as well as tangible benefits to be achieved from Cisco's consolidated network cabling, SingleConnect, which is virtualization-aware and eliminates significant re-cabling efforts. These benefits are captured in the "resource management" efficiency area.

  Included in the resource management efficiency line item are physical storage and networking set up tasks, which are estimated on a per-new VM basis over time. In the VersaStack scenario, an estimated 20 minutes of IT staff time is dedicated to networking and SAN configurations compared to 1.25 hours per VM in the PMO scenario for each VM added to the environment. Additionally, to account for steady state tuning and resource balancing over time, for each VM in the environment, a biannual, forty-minute labor cost is allocated to LAN and SAN moves, adds, and changes in the PMO. This labor burden assumption is four times higher than what is used in the VersaStack scenario due to the fact that VersaStack includes automated storage tiering which requires no administrator intervention. In the aggregate, over three years, these assumed differences result in an incremental $278,594 of IT efficiency in the VersaStack scenario compared to the PMO.

- **VM Administration:** VersaStack not only eases the lives of IT administrators with respect to physical resource provisioning and administration, but its deep integration with hypervisor vendors' software is also modeled to create material efficiencies in the realm of VM administration tasks. In particular, the ability to create virtual server templates and provision VMs from those templates in an automated and error-free manner is modeled to be markedly improved compared to more manual and error prone VM provisioning which is typical of traditional piece-part infrastructures.

  To account for the advantages of VersaStack, ESG's model first assumes a marginal improvement in the effort required to provision each virtual server in the environment—15 minutes in the VersaStack scenario compared to 25 minutes in the PMO. Additionally, to account for fewer errors occurring during VM setup, ESG's model assumes a nearly 50 times multiplier between the IT staff time dedicated to resolving VM provisioning errors in the PMO compared to the VersaStack scenario. These two assumptions lead to the $233,327 improvement in VM administration efficiency estimated in the model over three years.

Key Incremental End-User Benefits:

- Faster application deployment increasing productivity (as well as application time to value)
- Fewer and shorter application interruptions due to patching and move, add, change events
- Reduced application interruptions due to planned and unplanned downtime

As discussed, there are many ways in which a VersaStack deployment is expected to create IT efficiencies for the customer organization. However, that is not the end of the value story. The end-user community of the various workloads is also materially impacted, leading to increased productivity. ESG's model also quantifies the value of these user improvements in terms of expected gains in productivity based on the average fully burdened salary of application users (estimated as $91,000). However, it is important to note that ESG's model aims to be conservative, only counting 90% of time saved for users as productive. Key user productivity benefit assumptions for VersaStack are:

- **Application Deployment:** As noted in detail, in a VersaStack use case, both virtual server provisioning and reconfigurations are estimated to be completed much more efficiently. While significant to IT staff, VMs do not run in a vacuum. They support the applications end-users rely upon to do their jobs. Any delays in provisioning time result in periods of application unavailability and lost productivity. ESG's model accounts

for this fact by allocating relative application setup times of 30 minutes for VersaStack and 45 minutes for the PMO, scaled by the number of total applications in the environment (~150 in ESG's default scenario) and the average number of concurrent application users (40 per application in ESG's default scenario). The total difference in productive time is then multiplied by the average fully burdened productivity of end-users and adjusted down by 10%. The result over three years of operation is that the VersaStack helps enable an estimated $51,844 of incremental user productivity over the time horizon related to application provisioning and deployment.

- **Application Support/Management:** Beyond application deployment operations, ESG's model includes estimates related to ongoing application administration tasks that may impact availability, and thus, the productivity of users. For every application in the environment, ESG's model estimates biannual patch events, as well as biannual move, add, and change events. ESG's model assumes a near 50% improvement in these tasks. Thus there is an observed 50% improvement in the availability of applications across the entire application user environment during those events, resulting in an incremental $136,561 in user productivity in the VersaStack scenario.
- **Reduction in Planned and Unplanned Downtime:** A pre-qualified and tested platform, such as VersaStack, is much less likely to have interoperability problems compared to the PMO and is therefore estimated in ESG's model to be more reliable over time. This benefit, coupled with the error prevention features such as automated resource provisioning enabled through UCS Director, has a profound impact on application end-users in terms of the planned and unplanned downtime estimated in the environment.

  ESG's model accounts for these differences by making conservative assumptions about the frequency of planned downtime (1 event annually in the PMO, with a 10% reduction in events in the VersaStack scenario), the duration of planned downtime (12 minutes of lost productivity among all application users in the PMO versus 10 minutes in the VersaStack scenario), the frequency of unplanned downtime (25% chance of an event annually in the PMO, with a 10% reduction in the likelihood of an event in the VersaStack scenario), and the duration of unplanned downtime events (35 minutes of lost productivity among all application users in the PMO versus 30 minutes in the VersaStack scenario). The result is a total delta in expected user productivity of $205,664, favoring the VersaStack scenario.

The final benefit area which VersaStack is modeled to improve for customers is related to application time to value. This value is attributed to the fact that a converged infrastructure can be deployed faster than customer-built and -integrated platforms. With custom infrastructure deployments integrating many different vendors, the elapsed time to stand up the infrastructure and make it "production ready" is assumed to be much longer. Thus any revenue driven by the application workload is effectively delayed in the PMO, while it is capitalized on in the VersaStack scenario. To illustrate this value, ESG's model assumes a monthly application value of $500,000 and a default deployment time of 3 months for the PMO versus 1 month in the VersaStack scenario to estimate a total of $1M in incremental application value created for the hypothetical organization described in this report.

TCO Analysis

For the hypothetical customer scenario described in Table 1, the estimated three-year TCO for VersaStack platform—compared with the TCO estimated for the PMO—is displayed in Table 4. ESG's model considers significant differentiators of the IBM Storwize and Cisco UCS componentry present in the architecture when deriving TCO deltas. Additionally, the pre-validated nature of the design is estimated to reduce services and staff costs.

Table 4. Three-year TCO, VersaStack versus the PMO

Category	VersaStack	PMO	Percent Reduction with VersaStack
Hardware	$371,927	$498,542	25%
Software	$102,251	$147,699	31%
Infrastructure	$23,000	$40,250	43%
Maintenance and support	$71,127	$96,936	27%
Professional services	$146,453	$174,904	16%
Staff personnel	$30,164	$152,751	80%
Total three-year costs	**$744,922**	**$1,111,083**	**33%**

Source: Enterprise Strategy Group, 2016.

Major Cost Differences for VersaStack and the PMO

Key Areas of Cost Reduction:

- Greater VM density eliminates hardware over provisioning
- Right-sized hardware leads to reduced software licensing and maintenance costs over time
- Pre-validated design and integration reduces staff and professional services costs
- Impressive storage efficiency delivered through Real-time Compression eliminates capacity purchasing
- Native encryption at rest allows for the utilization of less expensive drives compared to alternatives

- **Hardware:** Several factors contribute to the overall $126,615 expected reduction in hardware costs modeled in the VersaStack scenario.

  First, as a tuned and balanced configuration, the VersaStack solution is expected to achieve greater VM density for the customer. As reported by customers, not only does shifting system design to IBM and Cisco ease IT labor burdens, but the outcome is generally improved. Most IT shops, and even experienced system integrators, do not have the expertise to create infrastructure designs which achieve parity with the validated designs developed by IBM and Cisco. The result is an elimination of purchasing hardware to support workloads, estimated on the order of $99,015.

  Next, the storage backbone of the VersaStack configuration deployed to meet the use case in question, IBM Storwize V7000, is powered by IBM Real-time Compression, a differentiated compression engine that, in the use case described, allows the customer to reduce raw capacity requirements by 30% more than the alternative storage solution selected. The result is an additional $20,400 savings in the storage purchased, which rolls up into hardware costs. Note that the 30% compression rate assumed in this scenario is very conservative and that higher compression rates can often be achieved yielding commensurately higher savings.

  Finally, another differentiating feature of the Storwize platform accounts for the remainder of the hardware savings expected. With Storwize, data encryption is abstracted from the physical hard drives and delivered natively by the storage platform. To achieve commensurate encryption at rest for data in the PMO scenario, the customer would need to buy more expensive encrypted drives. The result is the additional $7,200 in hardware costs expected in the PMO scenario.

- **Software:** As discussed above, VersaStack allows customers to achieve a smaller physical footprint to support their workloads through optimized system balance, which improves VM density. The smaller hardware footprint results in a commensurate reduction in the number of hypervisor and systems management software licenses observed in the PMO. For the scenario examined in the report, the result was an expected savings of $45,448 on management and virtualization software.

- **Maintenance and support:** While reduced hardware and software requirements in the VersaStack scenario result in significant CapEx savings in this analysis, there is a commensurate impact on OpEx. ESG's model assumes that all capital expenditures on hardware and software will carry with them an operational cost equal to 15% of capital costs incurred, spread over the three-year time horizon, to account for hardware and software maintenance and support. Thus ESG's model estimates a reduction in maintenance OpEx of $25,809 for the scenario discussed in this report.
- **Infrastructure:** Significant infrastructure savings—which include costs for items including racks, cables, utility costs, and other data center overhead—are observed in the VersaStack scenario in large part due to Cisco SingleConnect which greatly simplifies and reduces cabling requirements in the environment (while also simplifying networking operations and workflows). Additionally, the reduced hardware footprint of the VersaStack scenario further amplifies infrastructure savings. In total, based on ESG's evaluation and VersaStack customer anecdotes, ESG's model estimates a 75% improvement in data center infrastructure costs in the VersaStack scenario compared to the PMO ($17,250).
- **Staff personnel and professional services:** While many staff time improvements for tasks are captured in ESG's model by the IT efficiency savings area of the model, there are less operational savings to capture. Time spent focused on project management, system procurement, and meetings to discuss solution planning and operations do not directly impact day-to-day operation of the platform over time, but are material. These costs are captured in the staff personnel category. The added simplicity of consuming a converged stack reduces these costs as compared with traditional IT purchasing scenarios. In total, over three years, ESG's model estimates savings in this area to be $122,587, or slightly more than one fully burdened IT FTE. Additionally, a customer purchasing a converged platform like VersaStack is modeled to spend much less on third-party services dedicated to solution design, integration, and deployment. Much of this work has been done by Cisco and IBM through the validated design program.

The Bigger Truth

As evidenced in ESG research, IT decision makers have a strong affinity for converged infrastructure solutions. Moreover, outcomes associated with these deployments indicate that the broad adoption is warranted. Improvements in time to deployment, service and support, manageability, and scalability can have a significant impact on the organization's financial success.

Simply put: IT organizations have the opportunity to upset traditional data center economics by utilizing converged infrastructure solutions. VersaStack, one such converged offering in the market, displayed compelling economic outcomes in ESG's economic validation including a **293% ROI** and a **~4 month payback period**.

ESG's research and financial modeling conducted for VersaStack, one such converged infrastructure solution, attempts to quantify the scale of these benefits in relation to the associated costs. As discussed in this report, the dramatic business value, in the form of IT efficiency, user productivity, and application time to value, should far outstrip the associated costs of the system for customers. In fact, the costs associated with VersaStack for a typical customer environment are actually much lower than those expected with traditional data center architectures.

IT organizations looking to change the economics of running their data center—from cost center to value driver—would be well-served to evaluate VersaStack as a potential platform on which to run their business.

To run a customized scenario estimating the economic impact of VersaStack for you specific environment, please visit the interactive web-based calculator here:

http://www.versastack-ibm.esgcalculator.com

Appendix A

For this project, ESG adhered to the following research and modeling methodology:

- ESG conducted initial market research across IBM, Cisco, and other relevant IT vendors to assess current market trends, vendor value claims, and the purchase considerations that are most important and relevant to existing and prospective converged infrastructure customers.
- Based on the results of this initial research, ESG subsequently identified a "present mode of operation" or PMO—effectively, the alternative approach that customers are likely to take to meet their data center infrastructure requirements—against which the costs and benefits of utilizing VersaStack was to be compared. A conventional component-based infrastructure based on a combination of individually selected, tested, and integrated compute, storage, and network products was used.
- ESG then developed a comprehensive financial model designed to qualify and quantify the potential costs and benefits of utilizing VersaStack compared with the PMO.
- Next, ESG conducted a series of in-depth interviews with systems engineering, service and support, technical marketing representatives from IBM and Cisco, and, most importantly, actual VersaStack customers. The data collected in these interviews was used to refine assumptions built into the model related to current customer environments and the direct and indirect costs and benefits attributable to both VersaStack in potential customer environments. This research helped to inform ESG's understanding and analysis of integrated computing adoption drivers, usage trends, and the technical and operational (i.e., specific tasks and the relative labor burden associated with those tasks) benefits that have been realized by customers.
- Once the economic model was finalized and validation complete, ESG modeled a default scenario that was designed to demonstrate the relative costs and benefits of VersaStack in a representative enterprise environment. Those results were then compared with model outcomes for a similar-scale traditional virtualization solution based on separate compute, storage, and network components. The results for this default scenario are described in the body of this paper.

Please note that the data and conclusions presented in this report regarding the costs and benefits associated with implementing VersaStack compared with alternative infrastructure solutions reflect the output of ESG's economic value validation based on the specific use case and default scenario assumptions modeled for this report. ESG acknowledges that changes to these assumptions will lead to a different set of results and, as such, advises IT professionals to use this report as one validation point in a comprehensive financial analysis process prior to making a purchase decision. IBM and Cisco provided current standard pricing and configuration information for VersaStack to ESG. Other IT equipment and labor cost assumptions were obtained from publicly available sources such as IT vendor and channel partner websites and published price lists.

Enterprise Strategy Group | **Getting to the bigger truth.**

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