

WHITE PAPER

Converging the Datacenter Infrastructure: Why, How, So What?

Sponsored by: VCE

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EXECUTIVE SUMMARY

One of the key strategies that IT teams are pursuing to reduce capital costs while boosting asset utilization and employee productivity is the transition to highly virtualized datacenters. However, IDC finds that after impressive initial productivity boosts, continuing results often do not meet expectations for further improvements in IT asset use and operational efficiency. This lag occurs because of overloaded storage and data network facilities, overprovisioning of storage capacity, and sharply increased administration workloads. In combination, these problems can severely limit benefits as the scope of virtual server deployments expands.

As companies face a future in which they will need to deploy and effectively use hundreds, thousands, and even tens of thousands of server (and/or desktop) application instances in a virtual environment, they should consider deploying optimally (e.g., densest, greenest, simplest) configured converged infrastructure systems (server, storage, network) that are managed as unified IT assets.

Our research with five companies that have implemented Vblock Infrastructure Platforms from VCE indicated substantial business benefits associated with IT convergence and improved asset sharing. The results also showed reduced IT costs per unit of workload, faster deployment, and reduced downtime. These organizations reported reducing calendar time for deployment of new infrastructure from five weeks to one week and reducing staff time to configure/test/deploy by 75%. They indicated that, compared with their prior IT environment, the new infrastructure led to reductions in infrastructure hardware costs and IT staff time to manage operations that lowered the average annual datacenter cost by 68% per 100 users.

VCE develops a range of platforms and solutions for virtualized environments based on components from Cisco, EMC, and VMware. Research with five VCE customers showed that VCE's Vblock platforms can reduce the cost of IT while improving time to market and streamlining operations.

SITUATION OVERVIEW

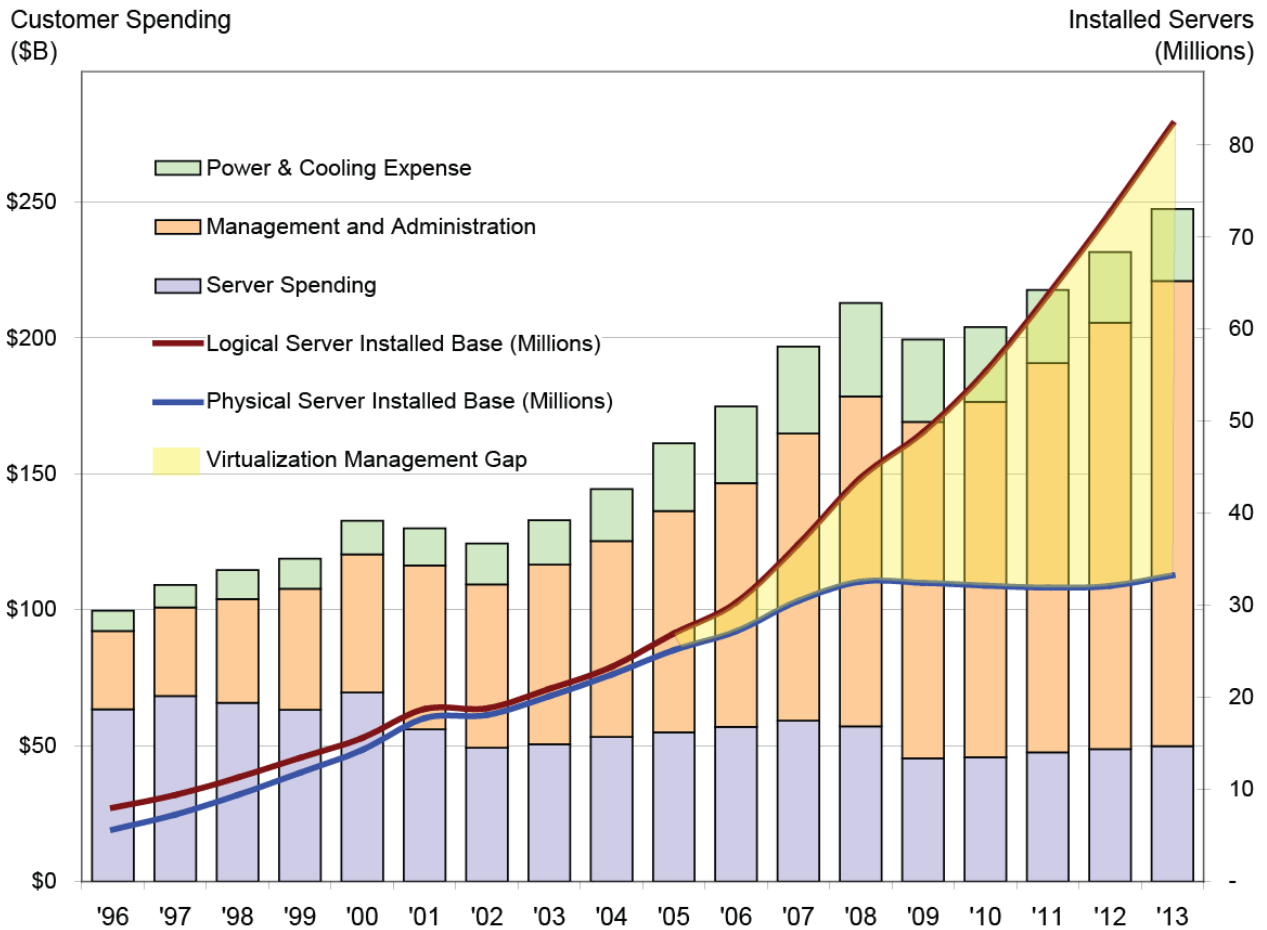
IT infrastructure has become the backbone of most businesses, supporting a wide array of applications and enabling diverse business initiatives. Most organizations know that to continue to grow and evolve, they must expand and innovate their information technology. Today, most companies buy and operate their own infrastructure. Over many years, these companies have built a complex series of hardware and software solutions that they individually have carefully tuned and integrated to meet the performance objectives of each application. This increased demand for IT places significant pressure on IT budgets and staffing resources. As a result, companies are continually striving to standardize, automate, and streamline processes to contain these costs and to increase business agility.

Server Virtualization Impacts Installed Infrastructure, But Not Management Costs

Over the past few years, virtualization has taken hold (see "Logical Server Installed Base" in Figure 1). IT organizations now run multiple applications per physical server, improving the utilization rates of server hardware and further lowering spending requirements for new server hardware. Virtualization has helped IT departments respond to spiking application demand so effectively that in a recent survey of datacenters, 75% of the IT managers interviewed indicated that they consider "virtualization first" for most applications. Because of virtualization, the growth in physical infrastructure has flattened out, but the growth in the number of virtual machines has exploded. The infrastructure management challenge in fact has increased, as depicted in the "Virtualization Management Gap" in Figure 1. Furthermore, our recent research shows that IT departments now spend three-quarters (76.8%) of their time and resources maintaining the environment and less than a quarter (23.2%) on value-added activities.

FIGURE 1

Rapid Growth in Virtualized Applications;
Increasing Pressure on IT Management/Administration



Source: IDC, 2012

Virtualization and Its Discontents

The relative ease with which application builders can use virtual machines to roll out new software or widen user bases has exposed and sharpened the significant challenge of acquiring, provisioning, and deploying the right level of platform (server, network I/O, and storage) capacity to enable this expansion. The words of one IT executive interviewed as part of this paper's research capture the urgency: "... We were building new lines of business and onboarding customers at an incredible rate ... we were constantly gated as an organization by the speed at which we could then assemble the IT infrastructure behind that." To keep up with this demand without overwhelming IT staff, organizations felt the need to change the way they acquired, configured, deployed, and maintained their IT services.

IDC finds that higher utilization of IT assets and operational efficiency — which results from running more virtual machines on new-generation servers — reaches a plateau and often levels out at a certain point. This happens because the shift to virtualized servers often leads to strains in other areas of the infrastructure:

- ☒ Virtual server sprawl increases server/storage/network stress and the accompanying administrative burdens required to deal with this stress. This makes support/maintenance more challenging and threatens application performance.
- ☒ Handling this anticipated pressure by overloading/overprovisioning storage and data network facilities forces time-consuming, costly, and often unnecessary hardware upgrades.
- ☒ Application performance and recovery behaviors (data recovery and cleanup) on error conditions can vary unexpectedly, stalling plans to migrate more business-critical applications to virtual environments.

How to Adapt

IDC found that a growing number of organizations are dealing with these issues and the virtual server management problem by investing in converged systems for IT infrastructure.

CONVERGED SYSTEMS FOR IT INFRASTRUCTURE

Converged systems provide a set of standard elements (e.g., blade servers for compute, modular storage systems for data, and a unified 10GbE fabric for internode and storage connections) preconfigured in a "system" to provide a predictable amount of IT capacity.

IT managers have traditionally sourced multiple products from a variety of suppliers as they construct their IT solutions, often acting as their own systems integrator in mixing and matching servers, storage, networking, and systems software. According to the 300 respondents to IDC's July 2011 *Server Team Survey*, IT organizations spend 23.3% of staff time and resources on this type of pre-system deployment — evaluating individual disparate hardware components; installing hardware; integrating server, storage, and networking; and integrating and testing hardware, middleware, and software. Managers who focus on minimizing deployment times for their business customers cannot brook the time spent prebuilding a converged environment in-house. In the words of one IT executive, "The homegrown [approach] takes longer for scaling hardware-dependent requests because of the complexity around all of the various options on how to scale. What part? What piece? What firmware? What upgrade? What's the order of items?"

However, of even more importance than staff time to today's managers, the build-it-yourself option costs calendar time delays in deployment to the business. Many of these organizations are looking for accelerated deployment because, in the words of a manager at a firm with multiple datacenters, "... We're able to go to our customers and commit to more aggressive dates. And that's huge. To put it in perspective, it can make a critical difference ... relative to a \$40 million deal, for example." Many of these businesses are skipping the home-built approach and opting for a prebuilt, preconfigured solution.

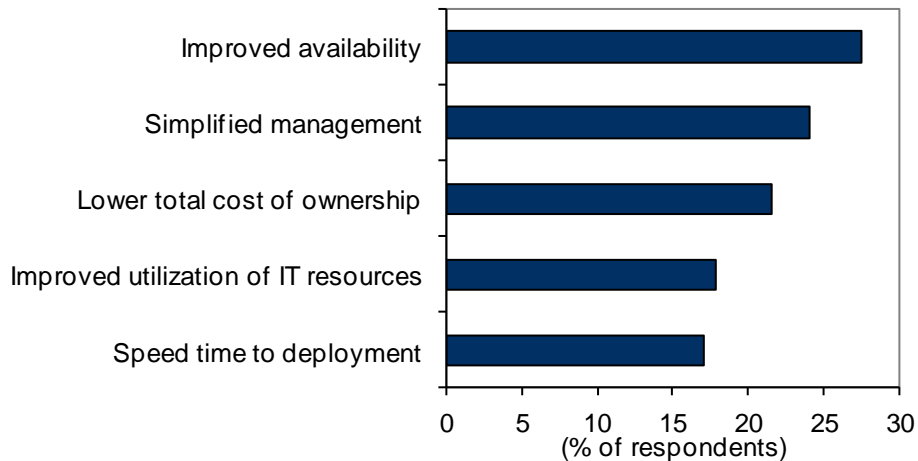
Preconfigured, Standardized, Ready

Improved availability, simplified management, lower total cost of ownership, higher utilization of IT resources, and speedier time to deployment are the top benefits recognized by customers of converged infrastructure systems, as indicated in Figure 2.

FIGURE 2

Major Benefits of Converged Infrastructure

Q. What do you see as the top 2 major benefits to converged computing?



n = 206

Note: Multiple responses were allowed.

Total may exceed 100%.

Source: IDC's *Server Team Survey*, July 2011

IDC believes that we are entering a new business cycle in IT where customers are prepared to trade choice for both ease of installation and simplicity of management. While the majority of customers are still evaluating converged systems, over a quarter (27.4% — approximately double the previous year's percentage) are currently using or planning to use them. IDC expects adoption to increase as 44% (also double the previous year's percentage) of those considering convergence will likely adopt in the next three years.

Excellent examples of such converged systems are VCE's family of Vblock Infrastructure Platform offerings. These converged systems allow administrators to move away from deploying each element (server, storage, network) individually and toward delivering what IT's customers actually need: availability and performance. They do so by deploying the optimal (e.g., densest, greenest, highest performance) combined system. Within a converged system, the compute, storage, and network devices are aware of each other and are tuned together for high performance across multiple workloads. One can then manage the unified IT assets in these converged systems (e.g., a rack, an aisle, or an entire datacenter of converged IT infrastructure) by leveraging a preferred hypervisor (e.g., VMware's vSphere), blade server chassis (e.g., Cisco's UCS server), network fabric manager (e.g., based on Cisco's Nexus

network platforms), virtualized storage systems (e.g., EMC's VMAX or VNX storage systems), and IT automation software.

Converged systems enable increased automation through dynamic partitioning and automatic load balancing supporting a pool of different business applications. This approach makes maintenance/support and disaster recovery within a datacenter or across geographically dispersed datacenters more simple, predictable, and cost effective.

We now examine the findings from a primary research study of enterprise datacenters that implemented VCE's Vblock platform. The following sections present how that system affected:

- ☒ IT hardware spending (server, storage, network) as datacenters expand
- ☒ Operational costs associated with IT asset selection, management, and maintenance
- ☒ System and business application delivery speed
- ☒ Application resiliency

The study provides a foundation for identifying how investing in a converged systems strategy based on solutions such as those from VCE can translate into immediate and sustained business value for your organization.

ASSESSING THE VALUE OF A CONVERGED DATACENTER INFRASTRUCTURE

VCE's Solution

Formed by Cisco and EMC with investments from VMware and Intel, VCE markets an integrated converged infrastructure solution for the datacenter. VCE develops a range of platforms and solutions for virtualized environments based on components from Cisco, EMC, and VMware. VCE's corporate charter is to accelerate the adoption of converged infrastructure and cloud-based computing models that dramatically reduce the cost of IT while improving time to market for customers.

VCE's flagship products are the family of Vblock Infrastructure Platforms. They combine computer, network, storage, virtualization, and management technologies into prepackaged units of infrastructure that are preengineered, preintegrated, and pretested. VCE provides customer support for the entire stack (software, network, compute, storage) via a single point of contact. In addition, VCE implements a full integration test approach to release and configuration management to further simplify IT operations.

VCE sells Vblock platforms to customers through a number of business partners, including its parent companies (EMC and Cisco) and a network of value-added resellers, systems integrators, and service provider partners. Close to 150 leading partners in 40 countries are actively selling Vblock platforms to a diverse global customer base. A number of partners also employ Vblock platforms as the foundation for their own hosted private and public cloud service offerings.

Converged Infrastructure: Quantifying the Value

To quantify the value associated with the benefits experienced using VCE's Vblock platforms, IDC interviewed five customers, nominated by VCE, to articulate their experiences using the platform. These companies, which all employ over 5,000 employees, are from the United States and Europe and represent a range of business sectors: healthcare, communications and media, retail, and government.

These organizations were facing the same IT challenges that all large organizations face today — aging infrastructure, annual growth in data (usually exceeding 40% per year), increased requirements to maintain and account for information, and continued automation of business processes. In response, they had committed to a converged infrastructure strategy and chose Vblock platforms as their vehicle. Each had deployed two to seven Vblock platforms, which currently provide 79% of the storage and 85% of the ports for their datacenters.

IDC quantified the costs and benefits that these organizations incurred through the use of Vblock platforms and compared them with the costs of traditional environments. Table 1 summarizes the benefits, and the following sections discuss these findings.

TABLE 1

Business Value Effects: Before and After Vblock Platform Implementation

Benefit Domain		Vblock Platform Impact	Result
Agility	Time to deploy new infrastructure	Avoided logical build, configuration, cabling, and integration tasks normally associated with separate infrastructure elements	Reduced calendar time for deployment from five weeks to one week
	Staff time to configure/test/deploy new infrastructure		Reduced staff time to configure/test/deploy by 75%
End-User Productivity	Reduction in user inactivity due to system/application outage and unavailability	Reduced downtime	Reduced server incidents from 13.7 to 0.5 per year Reduced user productivity losses by more than \$9,000 per 100 users per year
IT Staff Productivity	Reduction in IT staff time to manage and implement all aspects of datacenter operations	Reduced time to configure/test/deploy; simpler, one-source problem resolution for entire stack	Increased IT staff productivity by more than \$10,000 per 100 users
IT Infrastructure Costs	Reduction in acquisition/maintenance expenditures on hardware (servers, storage, network, etc.) and software	Higher utilization of storage, server, and network resources; consolidated footprint; lower power usage	Reduced costs for: <ul style="list-style-type: none"> • Storage by 60% • Network hardware by 63% • Servers by 41% • Power by 25% • Facilities space by 33%

Source: IDC's primary research with five VCE customers, 2012

Agility/Speed Benefits

Interviews revealed that by migrating to a converged infrastructure, companies substantially improved business agility. Several respondents indicated that they purchased their Vblock platform(s) because the technology enabled them to deploy infrastructure assets (hardware, network, storage, software) much more rapidly than they could have by building the converged infrastructure on their own.

On average, the "calendar time" involved in deploying additional new IT infrastructure (new server, storage, network capability) was reduced from an average duration of five weeks to only one week. Companies also reported a 75% reduction in the internal IT staff time to configure, test, and deploy this infrastructure and a 30% reduction in systems integrator cost for the deployment.

In the words of one service provider, "The big value for us ... is number one, accelerated deployment." According to another service provider, "If we were using a traditional architecture, we'd probably give it a month [versus a week]. To wait that long, we run the risk of running out of capacity prior to the availability of [the service and] ... we could get to the point where we couldn't bring in customers." Cutting the time to roll out new IT services so dramatically enhances IT staff productivity and agility. IT staff can scale and better serve business needs.

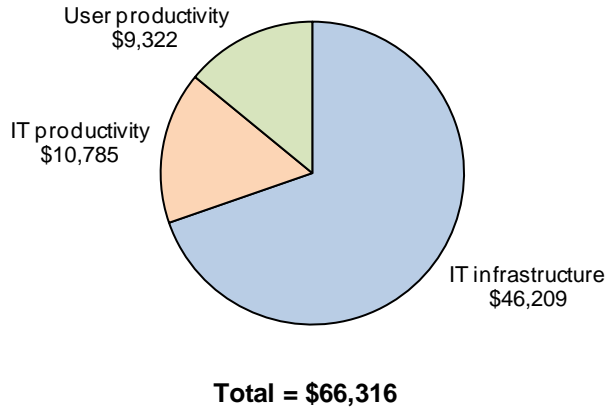
Efficiency Benefits

Respondents gained significant financial benefits from three main categories of efficiency improvements (see Figure 3)¹. When we compared the costs of providing a converged infrastructure platform with the costs of providing a traditional, nonconverged platform, we found that the companies in our surveys reduced annual user productivity losses (user inactivity due to system/application outage and unavailability) by more than \$9,000; increased IT staff productivity (IT staff time to manage and implement all aspects of datacenter operations) by more than \$10,000; and reduced IT infrastructure costs by over \$45,000 per 100 users.

¹ Note: IDC's Business Value tables and figures use a standard ratio of cost/benefit per 100 users to rationalize the data and allow readers to scale the factors proportionally to match the size of their organization.

FIGURE 3

Annual Benefits (per 100 Users)



Source: IDC, 2012

The in-depth surveys with these respondents shed light on how Vblock platforms delivered these benefits. The converged model appears to enable more efficient use of the available IT capacity than traditional IT siloed models allow. Certain key performance indicators of IT efficiency (see Table 2) highlight the efficiency improvements. The table compares the efficiency performance indicators for *pre-Vblock platforms*, *Vblock platforms*, and traditional infrastructures. The table shows that Vblock platforms enabled the organizations in the study to deliver 60% higher storage utilization and to almost double their networking port utilization — 93% increase compared with their non-Vblock platform operations. The higher utilization rates drive down hardware costs and make long-term infrastructure planning more reliable and efficient.

TABLE 2

IT Infrastructure Efficiency Performance Indicators

Performance Indicator	Traditional	Pre-Vblock Platform	Vblock Platform
Storage utilization (%)	40	50	80
Networking port utilization (%)	16	40	77
Time to market for new service (days)	25	22	11

Notes:

"Traditional" indicates industry-standard rates as determined by multiple previous IDC surveys.

"Pre-Vblock platform" and "Vblock platform" refer to respondents' average non-Vblock and Vblock platform environments, respectively.

Source: IDC, 2012

Optimized datacenter infrastructure. Migrating to a Vblock platform environment enabled these organizations to purchase modular units of infrastructure tuned to deliver higher utilization of networking, compute, and storage resources. All the organizations in our study indicated that they selected Vblock platforms because they had committed to migrating to a converged infrastructure and felt they either could not do it themselves or could not do it as efficiently and effectively as VCE. The converged infrastructure delivered the following cost efficiencies:

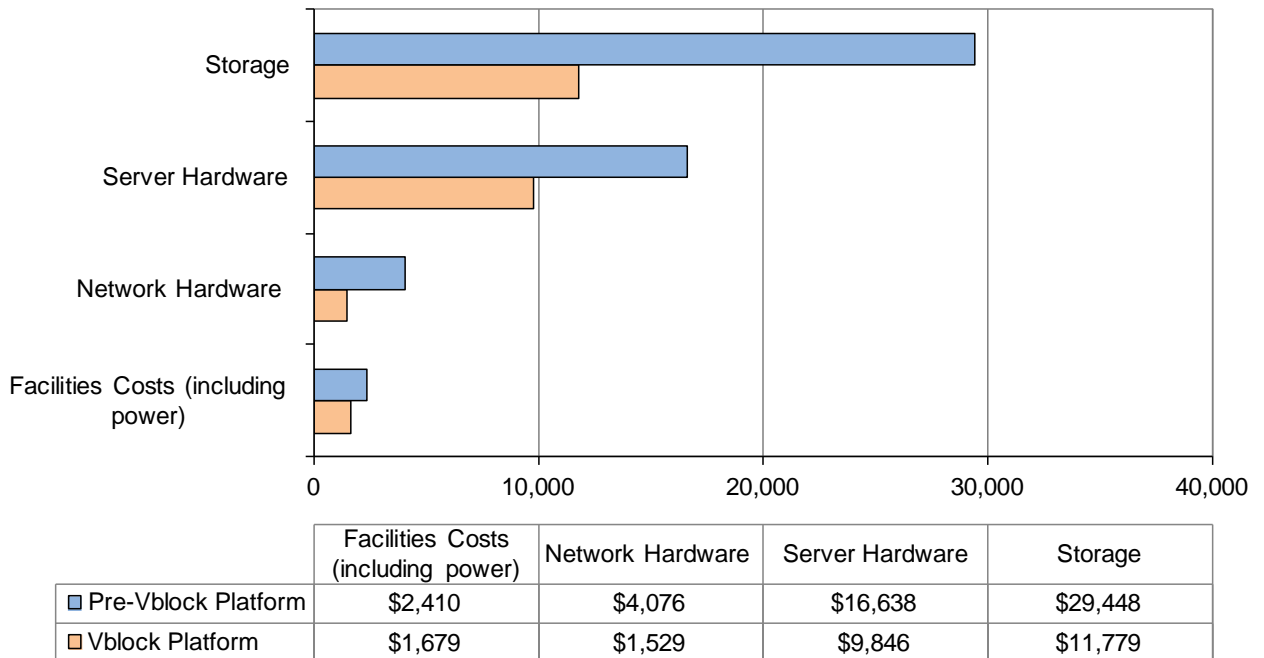
- ☒ **Storage.** Increased utilization reduces storage costs by 60%.
- ☒ **Network hardware.** Increased port utilization reduces network equipment costs by 63%.
- ☒ **Server hardware.** Increased CPU utilization decreases server costs by 41%. (On average, 83% of these organizations' servers are running a hypervisor.)
- ☒ **Power.** Higher utilization per CPU and reduction in cabling drive down relative power costs by 25%.
- ☒ **Facilities.** Higher utilization rates and consolidated footprint reduce cost for space requirements by 33%.

"The easy answer for why we chose the Vblock [platform] was we were going to build one ourselves. All of the hardware components are available off the shelf. But given our history and our experience with our homegrown or home-built converged infrastructure platforms, we were really running into support issues ... multivendor support issues. VCE provided us a way to ... eliminate that with their unified support stack."

Figure 4 presents the respondents' cost savings for each infrastructure element.

FIGURE 4

IT Infrastructure Cost Comparison: Pre-Vblock Platform and Vblock Platform



Note: Annual cost is per 100 users.

Source: IDC, 2012

Efficient IT staff operations. Our research indicated that the converged infrastructures also created efficiencies in IT staff operations by reducing the complexity and variety of platforms that the staff had to deploy and maintain. Purchasing preengineered, preintegrated, and pretested units of IT significantly reduces the staff time and resources dedicated to pre-system deployment activities, which, as we indicated, take up 23% of staff time and resources in the datacenter. Release and upgrade guidance facilitates transition operations, reducing time spent on these activities and eliminating infrastructure interoperability problems.

Some respondents felt that one of the most important benefits came from the ability to troubleshoot issues from a single person or source. Rather than involving multiple separate specialists — network engineers, hardware administrators, storage specialists — on a problem, companies found that a single, full-time VCE expert could evaluate all aspects of a problem and usually resolve it. In the words of one manager, "It's not only just the single screen ... it's really more that the philosophy changed as part of the Vblock [platform]. We started training people on the converged network ... the entire Vblock [platform]. We looked at it as one unit. It behaves as one unit. Our support is unified. We make a single call ... regardless of which 'parent' of VCE provided the equipment that we have a problem with, we have single-source support." This saves time, phone calls, and specialist expense.

Additionally, the higher utilization rate means that more users can be supported by the same number of staff. The net result in the organizations in the study was a 38% decrease in staff costs. The value of increased productivity is that IT staff resources are freed up to ensure higher quality of services, implement new initiatives more rapidly, and tackle projects that had been delayed for lack of such resources.

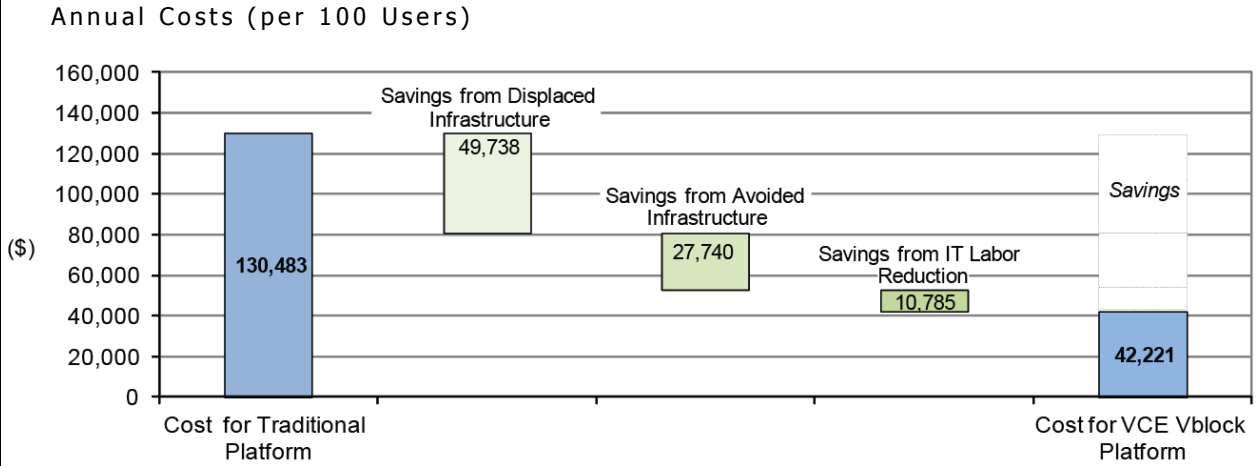
Lower total datacenter costs. By implementing Vblock platforms, the organizations in our study were able to reduce the average annual cost of their datacenters by 68% per 100 users. The costs saved included the:

- Costs associated with the aging infrastructure displaced by Vblock platforms, which no longer needs to be refreshed and maintained
- Costs avoided by not having to invest in new infrastructure on the traditional model to support the growth in datacenter requirements
- IT staff cost savings mentioned earlier

The infrastructure savings combined with the IT staff savings lower the average annual cost per 100 users by 68%, from \$130,000 to \$42,000 (see Figure 5).

"If we were going to try and do what we are doing now, but with a traditional solution, I think we'd need ten times as much equipment. If you add up those core switches ... the three ... 96-port blades per [switch], I have 1,000 workloads in my virtual layer. I couldn't have supported 1,000 servers. We don't even have the floor space for 1,000 servers."

FIGURE 5



Source: IDC, 2012

Reliable IT services. In addition to creating a more efficient infrastructure, the converged solution helps IT deliver more reliable services. As Table 3 indicates, the organizations in the study were able to reduce the number of downtime hours per year by 99%. The reasons for the improvement are the following:

- Consolidated footprint — fewer sites, collapsed communication lines, compressed networking
- Less complex environment designed to operate as one — fewer hardware and software incompatibilities and aging issues
- Freed-up IT staff resources can focus on quality

The value of lower downtime is that users are more productive and application utilization increases. In addition, operational and business risk is reduced.

TABLE 3

Downtime Performance Indicators

Downtime Measures	Pre-Vblock Platform	Vblock Platform
Server incidents	13.7	0.5
Hours needed to fix the problem	5.2	1.8
Server downtime hours	70.6	0.8
Downtime hours per user	10.9	0.1
Productivity loss	27%	

Note: All downtime and incident measures are for an entire year.

Source: IDC, 2012

Converged Environments Deliver ROI

IDC uses a three-step methodology for conducting ROI analysis:

- ☒ **Gather quantitative benefit information during the interviews using a before-and-after assessment.** In this study, the benefits included IT staff productivity increase, user productivity increase, and IT cost reduction.
- ☒ **Create a complete investment (three-year total cost analysis) profile based on the interviews.** Investments go beyond just the solution's hardware and software. IT departments spent staff time installing and configuring the new solution, removing old equipment and/or software, and then maintaining the new solution over three years. Ancillary costs directly related to the solution, such as user input to planning, outsourced installation, configuration or maintenance costs, and IT staff or user training, are also included in the analysis.
- ☒ **Calculate the ROI and payback period.** IDC conducts a depreciated cash flow analysis of the benefits and investments over a three-year period.

Because the full benefits of the solution are not available during the deployment period, IDC prorates the benefits on a monthly basis and subtracts the appropriate amount for the deployment time from the first-year savings.

IDC uses a discounted cash flow methodology to calculate the ROI and payback period. ROI is the ratio of the net present value (NPV) and discounted investment. Payback period is the point at which cumulative benefits equal the initial investment. IDC uses a standard 12% discount factor (allows for risk and the missed opportunity cost that could have been realized using that capital).

The three-year ROI analysis shows that on average, the organizations in this study spent \$59,208 per 100 users deploying and maintaining Vblock platforms and received \$152,332 per 100 users in benefits for an NPV of \$93,124. The companies saw a payback period of 16.2 months and an ROI of 157% (see Table 4).

TABLE 4

Three-Year ROI Analysis (per 100 Users)

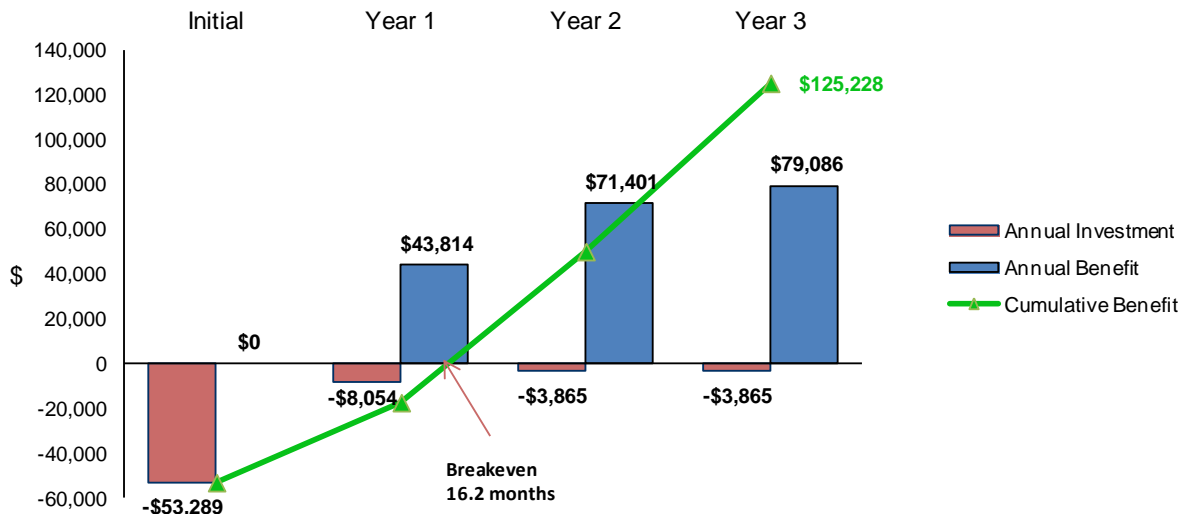
Benefit	\$152,332
Investment	\$59,208
Net present value	\$93,124
ROI = NPV/Investment	157%
Payback = Investment/NPV	16.2 months
Discount rate	12%

Source: IDC, 2012

Figure 6 illustrates the three-year investments and benefits associated with a Vblock platform deployment.

FIGURE 6

Vblock Platform Investment and Benefits over Time



Source: IDC, 2012

Challenges / Opportunities

Most organizations are now beginning a journey toward converged infrastructure datacenters that will take several years to complete.

VCE, as a leading provider of converged infrastructure offerings, must play a role in this journey, helping companies make the transition as painless and flexible as possible. Part of achieving this goal requires VCE to extend the scope of unified orchestration services across multiple converged systems and across multiple datacenters. The company also needs to provide more integrated backup and recovery capabilities for what is now a highly concentrated and critical datacenter asset.

A converged infrastructure approach presents technology challenges, but more important, it poses a significant number of challenges for IT organizations in terms of product evaluation, budgeting, roles, and IT operations management. Leading-edge adopters of converged infrastructure have dealt with these changes and evolved. Other organizations with less experience in this transition will need VCE's help to navigate the transition to tighter internal infrastructure standards, realigned datacenter organization, staff retraining, and financing and acquisition approaches. VCE and its business partners must educate customers and help them navigate the change.

WHAT CONVERGED SYSTEMS MEAN FOR THE DATACENTER EXECUTIVE

The transition to converged systems in datacenters will play a vital role in helping your IT team meet the fast-evolving business needs of your organization. It will also be critical in efforts to reduce both the capital costs and the operational costs of running datacenters and the applications/information residing in them. You must demand that IT suppliers deliver solutions that more tightly integrate the hardware elements, provide an open operating environment, and support full orchestration of resources across the entire datacenter and then across multiple datacenters.

Adoption of more efficient and more capable systems, however, is not sufficient. Your IT organization must adjust existing product selection and management practices to fully take advantage of converged systems. When speaking with IT executives considering broader use of this approach, IDC has three major recommendations:

- ☒ Embrace standardization of hardware and software components as much as possible because it can simplify management and interoperability challenges (be sure, however, that the approach also provides an interoperability and transition path for mission-critical applications on installed servers and SANs).
- ☒ Implement a mature, centralized, and automated approach to management operations with added investment in performance monitoring and analytics (but not solely at individual component levels) and install a chargeback system.
- ☒ Revamp the IT organization structure to move away from device-specific (e.g., server, storage, and network) administration and move toward an IT resource-oriented (e.g., database, collaboration, and archiving) structure.

In addition, the IT executive team should also meet with your finance department because a shift to a converged systems approach is also likely to mean a complete rethinking of IT budgeting and cost allocation. Don't let organizational/institutional barriers stand in the way of this important datacenter effort.

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