

WHITE PAPER

Business Value of Blade Infrastructures

Sponsored by: HP

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EXECUTIVE SUMMARY

Today, a company's datacenter is tightly integrated with its day-to-day business operations. Companies are increasingly looking to their IT as a means to gain a competitive advantage in the market rather than simply as a means of supporting business functions. IT applications and services have become a critical element in how companies interact with their customers, deliver new products and services, and improve their own workforce productivity.

Yet even though IT organizations are charged with delivering an expanding base of workloads and seemingly higher degrees of service-level agreements (SLAs), they are also challenged with constrained budgets and overburdened staffs. In response, IT organizations must seek efficiencies in their operations and shift to a more agile infrastructure that is flexible enough to adapt to future changes in the business.

Over the past decade, IDC has seen the industry move more toward distributed environments as lower-cost x86 systems have increased their share of workloads. While this migration has enabled customers to control capital expenditure with lower-cost servers, the increased operational costs of managing the x86 base are taxing IT budgets, making it difficult to fund and staff new initiatives.

This paper examines how seven enterprise and midsize companies spanning the equipment rental, healthcare, retail, research, and telecommunications (service provider) industries were able to reduce their annual IT cost to deliver compute services by 58% by migrating to a blade platform.

The integrated nature of the blade platform delivers efficiencies in system management, monitoring, and provisioning. HP BladeSystem utilizes HP Insight Management software and HP's Integrated Lifecycle Automation to automate key management processes, including a system's physical deployment, configuration, and problem management. Companies implementing blades were able to optimize their IT staff resources, reducing operating expenses by 64% and freeing up IT staff time for more innovative and valuable initiatives. HP BladeSystem server blades enabled these companies to consolidate physical servers and components while still maintaining the same workload capacity and performance. Blade technologies, such as HP Virtual Connect, reduced networking and hardware costs by enabling up to four physical functions per physical NIC/CNA port; a single HP Virtual Connect interconnect module eliminates four switches while enabling an infrastructure ready for change.

The study also demonstrated that virtualizing HP blades further improved IT infrastructure savings. By deploying a greater number of virtual machines (VMs) per physical server blade, IT organizations were able to further reduce IT infrastructure costs by 58%.

In addition to the IT operations cost savings, the study also shows how migrating to a blade environment improved IT availability. Relative to traditional server environments, customers with virtualized blades incurred 88% fewer server incidents per year and reduced server downtime hours by an average of over 90%.

IDC believes that HP BladeSystem delivers improved return on infrastructure investment for customers, creating a flexible IT environment that provides for both easier IT management and easier adaptation to the changing needs of the business. IDC estimates that over a three-year period, the companies in the study saw their implementation of a bladed infrastructure generate \$1.4 million in benefits over three years and deliver a return on investment (ROI) of 316%, and cumulative savings from the implementation paid back the full investment within a period of just over seven months.

WHAT'S CHANGING THE GAME?

IT Complexity Results in Business Inefficiency

Today's enterprise datacenters are complex environments that typically handle a wide variety of applications running on distinct types of platforms. In this heterogeneous datacenter environment, there's an increasing requirement to drive efficiencies by streamlining cost and changing how staff spend their time. In the face of these requirements, IT managers are challenged by constrained budgets even though they still must continue to deliver on increasingly stringent SLAs, build new applications, and maintain high levels of application availability. The issue of IT efficiency and agility is even more critical as more business units rely on tight integration with IT. The datacenter has become a cornerstone of the business; workforce operations and client relationships are increasingly driven by IT applications and services.

Many enterprise datacenters have adopted blade platforms and virtualization as key technologies deployed by the IT department in an effort to reduce cost and increase IT flexibility. IDC sees this trend continuing, with increased enhanced I/O and management tools to create agile environments via virtual resource pools. With a bladed infrastructure, IT organizations can deliver the flexibility and scalability to turn IT into a more service-oriented corporate function.

Challenges with Distributed x86 Server Environments

Enterprise datacenters continue to increase in scale and complexity every year. IDC research shows that companies have predominantly transitioned their IT environments to distributed x86 architectures. These scale-out deployments were driven by the ability to expand IT services to a greater number of business users. The lower price point for x86 systems over the monolithic business systems enable IT departments to control their

capital expenditures. However, this migration to a distributed environment created a more complex infrastructure that resulted in higher operational costs.

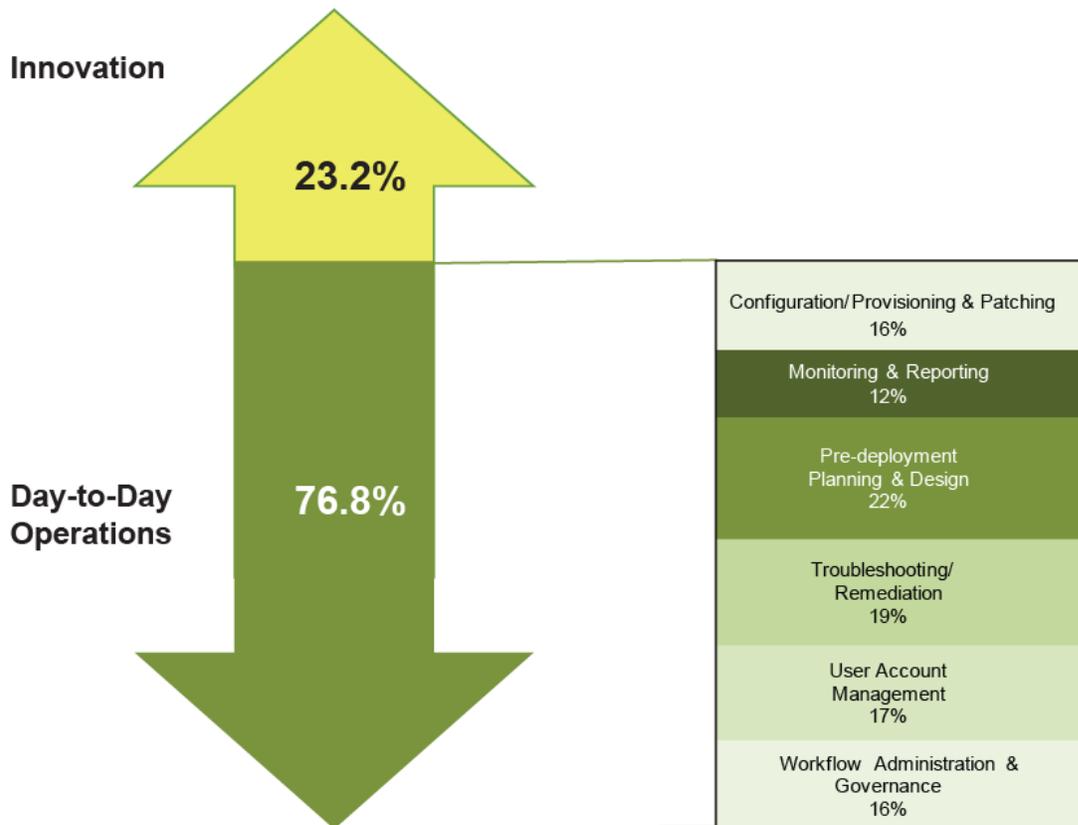
The management and administration cost associated with server environments has grown to eclipse cost in other categories. Many customers report that the personnel cost to maintain their server base consumes the majority of the IT budgets. Additionally, server power and cooling remains a top-of-mind issue. IDC's data indicates that annual energy expense associated with servers can reach up to 60% of the cost of the capital expense.

Customers have been relaying to IDC that their IT staffs are overburdened with operating their IT environments because of the complexity in the datacenter. As is shown in Figure 1, IDC's research indicates that generally, over three-quarters (76.8%) of IT staff time is typically spent on day-to-day IT management operations. Unfortunately, this results in less than 25% of staff time being spent on innovation and value-add initiatives.

FIGURE 1

Allocation of IT Administration and Operations Staff Time

Q. Over a given week, how do IT admin and operations staff spend their time?



Source: IDC's *Converged Systems Survey*, July 2011 and July 2012

Future Requirements for a More Efficient IT Environment

The complexity of IT environments and over-burdened IT staff are driving higher costs in the datacenter and negatively impacting the delivery of IT services. Going forward, IT managers need to implement solutions that can considerably reduce costs by:

- ☒ **Increasing IT hardware utilization.** The typical practice of over-provisioning server capacity results in wasted rack space as well as increased power, cooling, bandwidth, and operational costs. Consolidating server footprints via standard consolidated platforms such as blades can produce significant capital and operating cost reductions.
- ☒ **Simplifying management and increasing flexibility.** As currently deployed, most server configurations are static, hardwired, and difficult to change. Existing management processes and tools align with individual technology silos. The complex workflows and approval cycles between groups impact IT project delivery time and solution cost.
- ☒ **Improving server energy efficiency.** IDC finds that the primary driver behind efforts to improve energy efficiency is to ensure the availability of IT to the business by averting risks posed by power and cooling challenges. To avoid costly new buildout, IT must deploy more systems with the current available power.

Each passing year, it appears that the competitive environment requires businesses to both deliver applications faster and improve productivity. These requirements become challenging because of the complexity of server environments and the fact that they are inflexible and difficult to change and costly to manage. The costs associated with provisioning, monitoring, and managing servers have escalated, challenging IT organizations to seek systems and tools to help them lower the overall cost of IT operations.

BLADE SYSTEMS DRIVE EFFICIENCY AND SIMPLICITY TO THE IT ENVIRONMENT

Research Method

In the summer of 2012, IDC interviewed seven midsize and enterprise-level companies, referred to by HP, that have migrated 17–100% of their server environment to blades. These United States–based organizations represent experiences from the equipment rental, healthcare, retail, research, and telecommunications (service provider) industries (see Table 1).

TABLE 1

Respondent Demographics

Category	Average
Employees	4,224
IT users (internal)	3,872
Servers environment (total)	75
% traditional physical	30
% blades physical	17
% blades virtual	54
Number of IT staff	32
Applications	17
Applications: % virtualized	67
Storage (terabytes)	116
Storage growth (%)	107
Industries	Healthcare, equipment rental, retail, research, service provider

Notes:

Applications refers to the number of distinct business applications running.

Values represent the mean for all respondents (7).

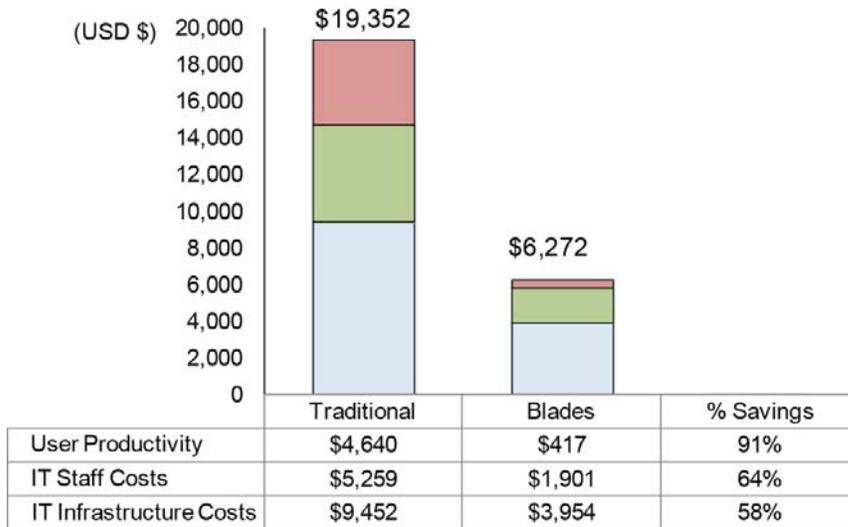
Source: IDC, 2012

The Results: Blades Deliver 68% Total Cost Savings

The organizations in this study had selected HP blades as the platform to virtualize their compute environments to converge and simplify their datacenters. Prior to acquiring blades, only one of the seven had implemented any appreciable virtualization. After the migration to blades, the average server virtualization is 80% and they have also virtualized 67% of their workloads. As a result, the organizations have reduced their annual costs by 68% (see Figure 2).

FIGURE 2

Costs for IT Infrastructure, IT Staff, and User Productivity with and Without Blades



Definitions and Notes:

- All values are per year (12 months).
- All values are per 100 connected users. We define connected users as the number of users actively linked to and interacting on the infrastructure network.
- The IT Infrastructure category sums the fees for hosting support; costs for switches, cabling, and network equipment; costs for storage; and costs for power and cooling, datacenter space, and so forth.
- The User Productivity category sums costs for users' lost productivity due to system/application outage and unavailability.
- The IT Staff Costs sum the costs of IT staff time to manage and implement all aspects of datacenter operations.

Source: IDC, 2012

Reducing the Cost of Infrastructure Across the IT Environment

The customer interviews and IDC ROI modeling make clear that blades deliver cost savings in several areas, yet there are four main categories of efficiency improvements:

- ☒ **Compute infrastructure.** Migrating to a blade environment enables customers to consolidate physical servers while maintaining the same workload capacity and performance, which reduces capital expenditure on server hardware. IT organizations are able to improve IT resource utilization rates by reducing the number of servers, a factor that is further enhanced through virtualization. Those companies using outsourced server hosting services reduced their hosting costs. Companies implementing blades reduced server hardware and associated software and hosting costs by 58% (see Table 2).
- ☒ **Network infrastructure.** All of the companies have deployed Virtual Connect modules and as a result have reduced LAN and SAN switching and cabling costs by 60%. The reduction in SAN switching comes from the ability to connect a storage link with an entire BladeSystem and thereby avoid the need to attach separate Fibre Channel (FC) host bus adapters (HBAs) for each server. Customers were able to preserve their investments in LAN and SAN even though storage requirements were doubling annually.

☒ **IT facilities.** Blades reduce power and cooling consumption because of the integrated platform and efficiencies gained through shared power and cooling components. On average, companies in this study reduced power costs and avoided facilities expansion, saving an average of 63% for facilities footprint costs and 36% for power.

☒ **Hosting.** Some organizations reported that with the improved availability that blades enabled them to achieve, along with increased datacenter staff time available, they could bring "back in house" Web content and applications that they had formerly hosted externally, leading to a 75% reduction in hosting costs.

As Table 2 illustrates, IT organizations that migrated to HP BladeSystem reduced their annual IT infrastructure cost by 58%. The greatest areas of savings included facilities (footprint and energy) (63%), server hardware (55%), network hardware (60%), and power and cooling (36%). Table 2 presents the relative reduction in various datacenter costs — facilities, hardware, software, power and cooling, and so forth — that survey participants experienced after implementing BladeSystem.

TABLE 2

Costs for IT Infrastructure Elements in Traditional Versus Blade Environments				
	Traditional (\$)	Blades (\$)	Savings (\$)	% Savings
Server hardware	2,919	1,301	1,618	55
Hosting fees	1,060	265	795	75
Facilities	389	144	245	63
Network hardware	2,812	1,124	1,689	60
Power	1,182	752	430	36
Management tools	441	265	176	40
Storage	908	211	696	77
Total	9,712	4,062	5,649	58

Definitions and Notes:

- All values are per year (12 months).
- All values are per 100 connected users. We define connected users as the number of users actively linked to and interacting on the infrastructure network.
- The IT Staff Costs sum the costs of IT staff time to manage and implement all aspects of datacenter operations.

Source: IDC, 2012

Virtualization Further Enhances IT Efficiencies

IDC has always believed that blades represent an excellent consolidation platform; several organizations in the study chose blades to initiate virtualized environments. IT organizations running virtualization for more than 70% of their blades ranked highest across our sample in IT infrastructure savings. As an increasing number of VMs are deployed per physical server blade, IT is able to further reduce hardware expenditure, as well as the cost of tools, by purchasing the appropriate amount of system software for the reduced hardware footprint.

Enhanced Connectivity

The blade platform is an integrated architecture that matches well with the goals of virtualization. It is common to find blade deployments that are heavily virtualized to the point where the number of virtual servers dwarfs the physical servers. While

virtualization has benefits in lower capital expense and consolidating physical footprint, there are still a number of challenges to server connectivity, most notably:

- ☒ I/O bottlenecks because of the running of a higher number of virtual machines on physical servers
- ☒ Two parallel but separate networks: Ethernet-based LANs for their servers and storage area networks (SANs) for storage (This is costly and inefficient, both in duplicated capital requirements and in network administration and management burden.)

HP Virtual Connect is a network technology designed to simplify the connection and management of servers to datacenter networks. By creating pools of LAN and SAN addresses that can be assigned dynamically to server bays, it decouples the network addressing from the server hardware and effectively "virtualizes" the network connections. Virtual Connect then delivers a "wire once change ready infrastructure" that allows the server administrator to become more autonomous in deploying and managing servers and their connections to the network while freeing up time for network and storage administrators to focus on their core areas and not be consumed by server administration tasks.

HP Virtual Connect addresses the I/O bottleneck by enabling up to four physical functions per physical 10Gb NIC port; only two interconnect modules are now needed, compared with the eight switches and additional I/O mezzanine cards (both Ethernet and Fibre Channel) that would have been required previously. Additionally, one of the latest enhancements is the ability to direct connect Virtual Connect FlexFabric to HP 3PAR SAN Array, eliminating the need to deploy a costly and complex Fibre Channel infrastructure in between the blade chassis and storage SAN. This results in simplified storage network management, faster deployment, and further reduced hardware costs.

Blade Management Tools Drive IT Staff Productivity

The integrated nature of the blade platform allows for centralized management of all servers and components within the enclosure. The centralized management results in more efficient methods of provisioning, monitoring, and managing. These efficiencies in turn reduce the amount of IT staff time required for IT infrastructure administration, allowing companies to apply that newly available staff time to other activities more directly related to the business, such as business application expansion or enhancement (see Figure 3).

Blade platforms, such as the HP BladeSystem c-Class, which utilizes HP Insight Management software, help IT organizations reduce their overall server management complexity and respond more efficiently to change. HP's newest generation of servers leverage HP's Integrated Lifecycle Automation. The server systems have built-in intelligence that can make servers easier to set up and maintain, which in turn reduces operation and deployment costs. Specific features include:

- ☒ **HP Intelligent Provisioning.** The configuration and provisioning tools are embedded in the server, thereby eliminating the need for CDs/DVDs in setup.

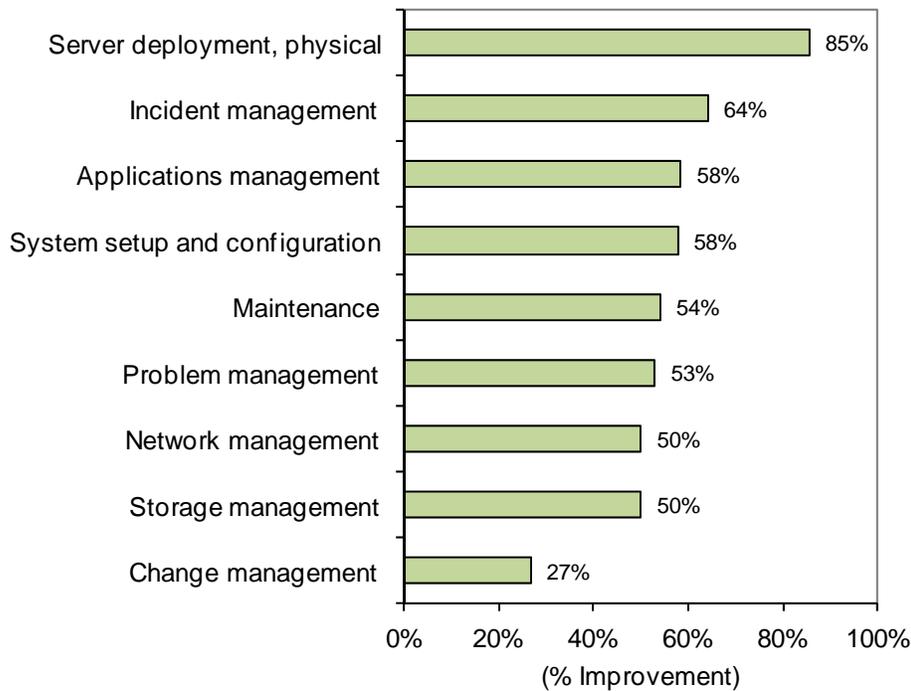
☒ **HP Active Health.** Servers can automatically analyze their own health across 1,600 data points. HP claims this information enables you to start problem analysis five times faster and spend less time with support reproducing or describing errors. Unplanned downtime can be prevented through self-monitoring, self-diagnosing, and proactive support.

☒ **HP Smart Update.** Firmware and software updates are now automated. This new feature lowers IT maintenance windows and reduces potential human error.

Blade platforms that utilize enhanced management tools allow the system administrator to more efficiently manage the server environment over the entire life cycle. It is typically found that human error is the cause of a high number of server incidents that lead to downtime, system damage, and data loss. Automating routine tasks can reduce these incidents and also ensure that IT resources are focused on more value-added initiatives.

FIGURE 3

IT Staff Productivity Improvement per Task



Source: IDC, 2012

Power and Cooling

HP BladeSystem incorporates HP Thermal Logic technology to help HP customers achieve greater power and cooling efficiencies in their IT environments. HP Thermal Logic includes technologies, from system to enclosure, that enable server infrastructures to pool and share power and cooling resources, and then efficiently deliver those resources based on the performance level required.

The HP BladeSystem enclosure utilizes Platinum Power supplies with 94% efficiency for increased energy efficiency. Additionally, the HP Dynamic Power Saver mode enables more efficient use of power by placing power supplies in standby mode during periods of low utilization. HP Power Regulator, built for ProLiant, dynamically changes each server's power consumption to match the needed processing horsepower, thus reducing power consumption automatically during periods of low utilization.

A datacenter's maximum power capacity — not floor or rack space — is often the limiting factor in determining the compute power in any given facility. Unfortunately, power in the datacenter is rarely efficiently allocated, and the full power budget envelope is seldom used. HP Dynamic Power Capping and HP's intelligent Power Distribution Units (PDUs) enable IT to allocate power to individual servers based on measured usage versus faceplate estimates, thereby reclaiming unused energy in the datacenter.

Blades Reduce IT Risk and Increase User Productivity

Today, the availability of IT applications and services is critical to the business; unplanned downtime of IT can lead to the interruption of business operations and even loss of revenue. This ROI analysis demonstrates how blade environments can reduce IT risk by lowering the number of server incidents as well as the time needed to bring the system back online.

As Table 3 illustrates, organizations involved in this study reported that running virtualized OS images on blades has reduced the average number of annual server incidents experienced by over 88% versus a traditional environment. Total server downtime hours have been reduced by 90%, and each user is getting back nearly 14 hours of productive time annually.

"We are in a high-availability configuration and, by far, more stable with the blades. With a traditional server, we used to schedule about 5 hours per year for complete blackouts. And now the blades have none. We do suffer unplanned downtime 3–4 times per year for traditional servers, but no unplanned [downtime] for the blades." — *Director of IT, Excelled Sheepskin & Leather Coat Corp.*

TABLE 3				
Risk Reduction Key Performance Indicators				
	Traditional	Blades	Savings	% Improvement
Server incidents per year	42.3	5.2	37.0	88
Hours needed to fix the problem (MTTR)	1.7	1.4	0.3	16
Server downtime hours per year	70.4	7.3	63.1	90
Downtime hours per user per year	15.2	1.4	13.9	91

Source: IDC, 2012

In addition to benefiting from increased application availability, end users in this study increased their productivity through faster application speeds. Productivity increases as high as 15% were reported, with the average being 5%. The productivity increase equates to 12 hours of productive time added to each user.

Optimized Computing Environments Drive Improved Business Productivity

Over the past couple of years, priorities related to IT buying criteria have shifted from increasing IT productivity to increasing business productivity. Six of the organizations interviewed expressed how the migration to HP blades has sped up their project turnaround time by 25–96%. Two of the organizations surveyed provided cloud services and hosted applications and indicated that their blade adoption had enabled them to increase their revenue. They found they could leverage the flexibility and added capability that blades gave them to add customers more easily and deliver applications more easily. This resulted directly in the addition of more customers and the delivery of higher volumes of application transaction activity, enhancing revenue-generating operations, as highlighted in Table 4.

TABLE 4

Business Productivity Improvements That Blades Enabled for Selected Service Provider Respondents

	Respondent 1	Respondent 2
Primary Business:	Cloud Provision	Application Hosting
Source of Increased Revenue:	Increased capacity for new business	Faster deployments and customer responsiveness
Revenue Increase Enabled by Blades (Estimate):	\$637,500	\$150,000
Estimated Increased Profit:	\$63,750	\$15,000
Respondents' Description of Benefit:	"100% ... because we can turn customers over faster. It's faster revenue. We used to turn down jobs because we didn't have the bandwidth. Now, I don't need to turn down jobs. I think that's new revenue, actually, that we're seeing gathered quicker in this new data facility, as opposed to the old ones."	"It definitely impacts the business. We have a better chance of capturing the client's money. As we're bidding for new clients, we are able to capture and react quicker. That results in more revenue."

Notes:

- All values are per year (12 months) per firm as estimated by the respondent.
- Profits are calculated at 10% of revenue.

Source: IDC, 2012

Blade Environments Deliver Improved ROI

IDC interviewed seven companies, referred by HP, that had implemented HP BladeSystem to record their results. IDC used the following three-step method for conducting the ROI analysis:

- ☒ **Gathered 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.

- ☒ **Created 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.
- ☒ **Calculated the ROI and payback period.** IDC conducted 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, which 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 companies in this study spent \$7,524 per 100 users (discounted) deploying and maintaining HP BladeSystem and received \$31,315 per 100 users in benefits (discounted) — reduced operating costs, revenue improvements, and so forth — for an NPV of \$23,790. The companies saw payback in 7.3 months and achieved an ROI of 316% (see Table 5).

TABLE 5

Three-Year Return-on-Investment Analysis (per 100 Users)

Category	
Benefit	\$31,315
Investment	\$7,524
Net present value of investment	\$23,790
ROI = NPV/investment	316%
Payback	7.3 months
Discount factor	12%

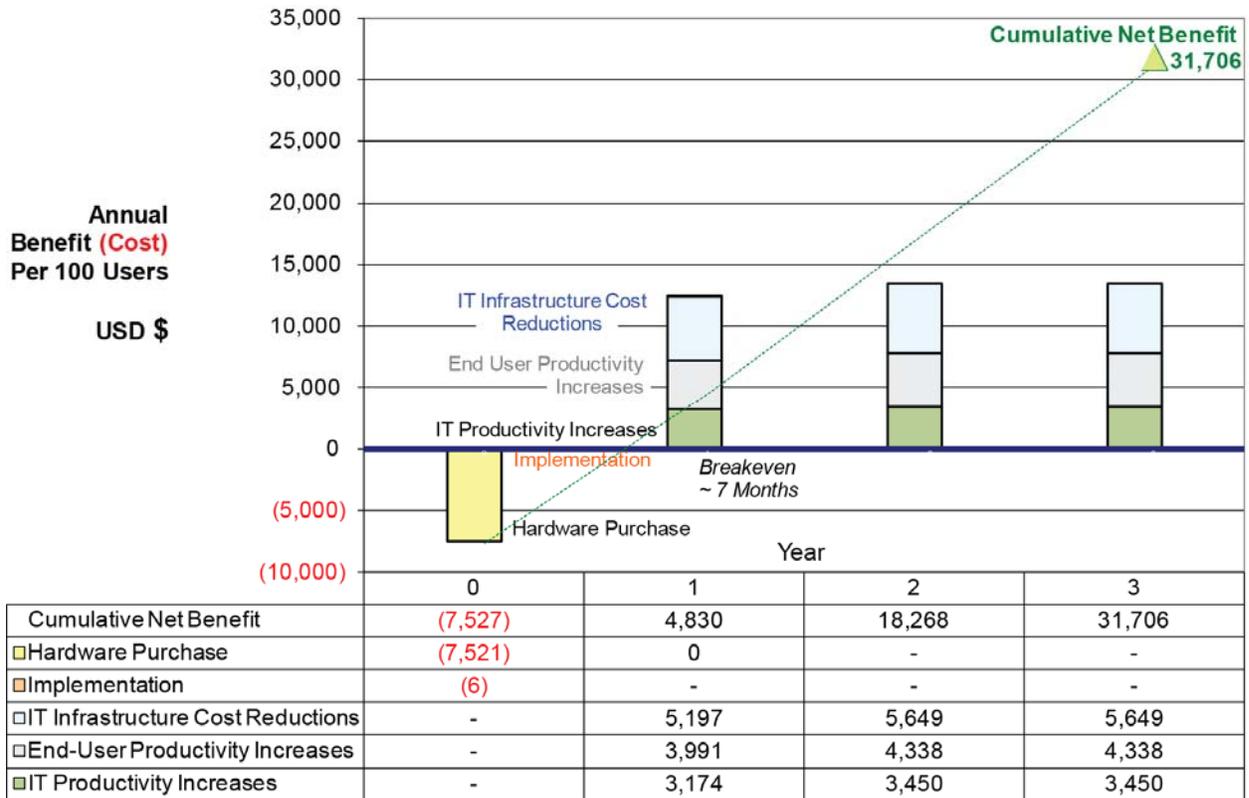
Source: IDC, 2012

Service providers and other organizations migrating to blades infrastructure for their revenue-generating workloads can expect higher returns.

Figure 4 shows the three-year pro forma analysis. Organizations in this study made an initial investment of \$7,527 per 100 users, which included the purchase and implementation costs for consulting services and the IT labor required for deployment and training. Based on that investment, the organizations realized average annual benefits of over \$13,000 per 100 users. Over a three-year period, each company saw cumulative net savings of over \$31,700 (undiscounted) per 100 users.

FIGURE 4

Three-Year Pro Forma Bladed Infrastructure Investment and Returns



Definitions and Notes:

- All values are per year (12 months).
- All values are per 100 connected users. We define connected users as the number of users actively linked to and interacting on the infrastructure network.
- Pro forma assumes that the initial cost of the solution occurs as lump sum outflow in year zero.
- The Hardware Purchase category sums the acquisition expenditure on hardware (servers, storage, network, etc.).
- The Implementation category sums the time for staff to learn and implement new technology; this line also includes ongoing costs for tools, maintenance.
- The IT Infrastructure category sums the net reduction (increase) in fees for hosting support, the reduction in requirement for adding switches and cabling network equipment given consolidation of server infrastructure, the reduction in requirement for adding storage capacity to handle demand given higher utilization of storage capacity, and the reduction in cost for power and cooling, datacenter space, and so forth.
- The End-User Productivity category sums the reduction in users' lost productivity due to system/application outage and unavailability.
- The IT Productivity category sums the reduction in IT staff time to manage and implement all aspects of datacenter operations.

Source: IDC, 2012

CHALLENGES/OPPORTUNITIES

While the study demonstrates the improved ROI, IDC acknowledges that blade vendors still face some challenges. Identifying and allocating expenses is not always a straightforward or well understood process in IT organizations. Hard costs, including the expense of hardware or software licenses, are tangible and relatively easy to measure.

However, soft costs, such as hardware cabling costs, facilities charges, and personnel hours needed to configure and manage the environment, are often not accounted for with precision. Moreover, the business value directly associated to IT operations is increasing important criteria in measuring IT efficiency. A more sophisticated ROI analysis is required to demonstrate the full benefits of and cost savings from blade environments.

With each new product generation, vendors continually improve their blade offerings. Additionally, customers have a better understanding of the technology, and the improved services from vendors have made it easier to deploy blades into IT environments. However, companies are increasingly presented with numerous methods to deliver IT services. These models are both on- and off-premise, including converged, private cloud, hosted, colocation, and public cloud. While many of these newer delivery models, such as public cloud, do not provide the security and availability necessary for enterprise workloads, they do have a trending perception with business units that IT organizations often must counteract.

This finding shows that HP and other blade vendors face a number of nontechnical challenges as they seek to deliver blade-based solutions. IDC market data indicates that blades represent 17.9% of the total worldwide server investment. To drive further blade adoption, vendors will need to convey the message of how blades deliver a better total cost of ownership than traditional environments.

CONCLUSION

This IDC ROI analysis indicates that customers can achieve considerable cost savings and improve the agility of their infrastructure by migrating to an HP BladeSystem environment. The companies in this study were able to pay back their initial investment in less than a year, a significant factor given the financial constraints most IT organizations are facing.

IDC believes that the datacenter of the future will require IT organizations to increase the utilization of their hardware, simplify their management, and improve the energy efficiency of servers. By leveraging HP BladeSystem and technologies such as HP Insight Control, HP Virtual Connect, and HP Thermal Logic, customers will be able to reduce their operating expenses and improve the flexibility of their IT environment. As a result, a greater portion of IT budget and staff time can be allocated to new initiatives that drive value back to the business.

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