

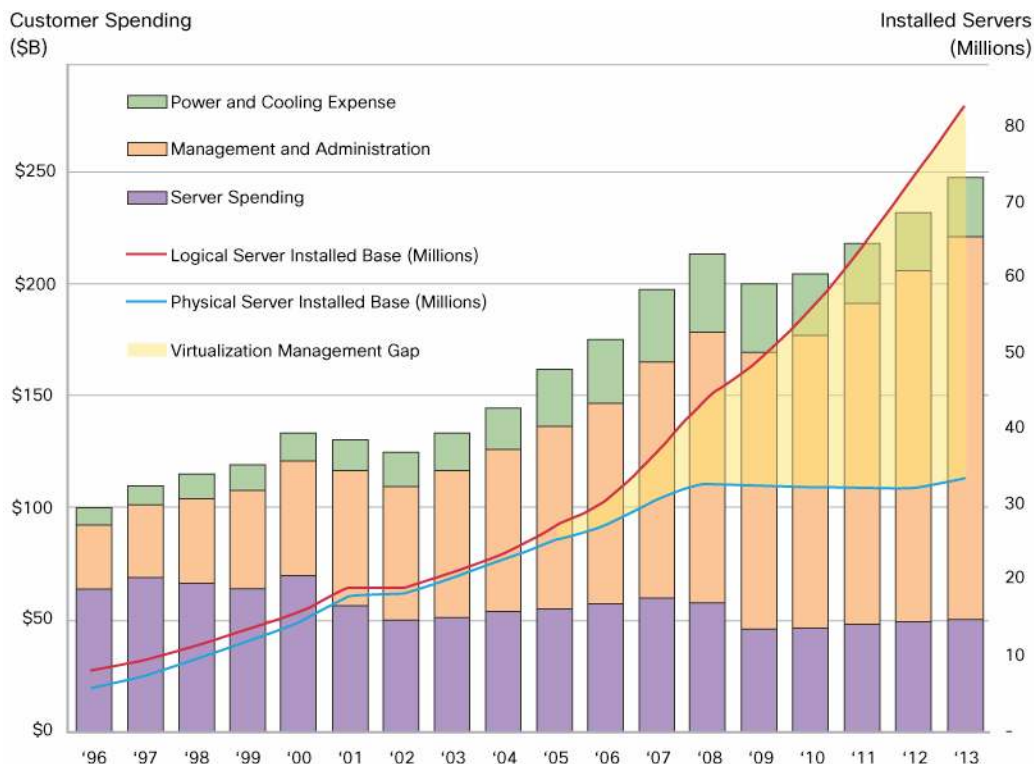
Redefining the Economics of Data Center IT Productivity

What You Will Learn

When organizations talk about improving their technology return on investment (ROI), they typically are referring to their investments in hardware or software—but in fact, the greatest opportunity to increase your technology return may come from improving the productivity of your data center IT staff.

Most companies rely on technology to deliver their competitive advantage, and IT departments perform a critical role in corporate innovation. Unfortunately, however, the overwhelming majority of IT human resources—more than 75 percent¹—are spent on maintenance activities (updating existing servers, management and operations, etc.) instead of new strategic initiatives. Despite the fact that virtualization has improved server utilization rates, as the number of virtual machines has increased so has the complexity of data center infrastructure management. With this “virtualization management gap,” as the number of virtual applications continues to grow, the cost of managing and maintaining the data center continues to increase. Without automation of the provisioning and management processes, management complexity will continue to increase, causing virtualization levels to plateau and depriving organizations of the full benefits of virtualization and cloud solutions (Figure 1).

Figure 1. Customer IT Spending: The Virtualization Gap



¹ IDC 2012, Converging the Data Center Infrastructure: Why, How, So What?

In addition, processes that provide departments with needed IT technology are characterized by long provisioning times as IT staffs often try to customize IT resources and network services to match each request. The result: decreased agility and delays in bringing innovation to market.

To redefine the economics of data center IT productivity, organizations need to simplify, standardize, and automate management processes to:

- Reduce management cost as a percentage of total data center costs and remove management complexity as a barrier to further virtualization
- Free IT staff from maintenance activities to focus on strategic projects that increase the organization's competitiveness
- Automate the provisioning process to allow IT to better align with the dynamically changing needs of today's business

The purpose of this document is to help IT departments envision the cost savings, productivity improvements, and economic agility benefits they can attain by focusing on these three goals.

Simplify, Standardize, and Automate Management with Cisco Unified Data Center

Siloed data center resources and management complexity go together. If each element of a data center needs to be managed separately using different processes requiring different skill sets, scaling that data center adds complexity. Instead of trying to improve management within a technology silo, Cisco's strategy is to take a unified approach, with the goal of improving productivity and streamlining processes that work across all types of data center resources.

The three-pronged approach of the Cisco® Unified Data Center helps organizations simplify, standardize, and automate their data centers, providing the following benefits:

- **Simplified architecture and management:** The Cisco Unified Data Center platform integrates computing, networking, storage, and virtualization resources to deliver dramatically reduced management complexity and simplified scaling and resource sharing.
- **Standardized tasks:** Cisco Unified Management, the underlying management infrastructure of the Cisco Unified Data Center, helps organizations expedite process standardization while maintaining and enforcing existing governance and compliance policies.
- **Automation:** Cisco Unified Management provides a complete management solution for both the virtual and physical infrastructure layers, helping ensure that customers significantly increase speed and agility in managing today's data centers.

Simplified Data Center Architecture Enables Efficient Scaling

The Cisco Unified Data Center architecture enables process integration and resource convergence to streamline tasks, improve productivity, and reduce training costs so that data center resources can scale efficiently.

The Cisco Unified Data Center delivers breakthroughs in efficient scaling through a simplified architecture designed specifically for virtualization and cloud solutions. Instead of the traditional blade environment, in which each blade has its own

ECKD

- Reduced adapter and cable count by 90%
- Accelerated time to market for new services
- Enabled customers to dynamically scale resources on demand

Ethernet switching, Fibre Channel switching, and management infrastructure, the Cisco Unified Computing System™ (Cisco UCS®) integrates the server, network, storage, and virtualization resources into a single, unified system. By extracting networking and management from the blade chassis and putting it instead in the top-of-rack interconnect, adding a new Cisco UCS blade is as simple as plugging it into the chassis. No cabling is necessary because all connectivity is provided by the unified fabric. After a chassis is full, adding capacity is as simple as adding a new chassis to the rack and attaching the appropriate number of 10 Gigabit Ethernet cables to the interconnect to provide the required throughput to the chassis. In contrast to management for traditional blade environments, the centralized management provided by the fabric interconnects eliminates the need to configure the Ethernet and Fibre Channel networks or management elements on a new chassis, significantly reducing the effort required to scale out a large infrastructure.

EXAMWORKS

- Saved US \$200,000 annually in IT resources

For example, with a Cisco UCS server, customers can add blades 47 percent faster with 67 percent fewer steps than with an HP server.² In a large-scale deployment or server refresh, choosing Cisco UCS can save an IT staff days or weeks of work, reduce the possibility of errors by simplifying the configuration process, and lower the organization's total cost of ownership (TCO).

Cisco UCS is also designed to scale without management complexity. A fully populated fabric interconnect pair can connect and manage up to 160 blades. The fabric interconnects act as a single point of management, using configurations based on service profiles, service profile templates, pools, and policy-based management to provide the agility essential to deliver computing capacity during peak demand. When a Cisco UCS fabric interconnect switches are fully used, a new Cisco UCS domain can be efficiently created and managed through Cisco UCS Central Software, which provides unified, centralized management for multiple Cisco UCS domains even if they are distributed within or between data centers.

Efficient Management of Virtual Machines

Instead of trying to manage virtual machine policies and security through a manual process, Cisco UCS incorporates embedded intelligence that creates a virtual machine-aware environment. With Cisco UCS, organizations can identify each virtual machine and then track and grant policies and services for its lifecycle, regardless of where it migrates within Cisco UCS. This approach helps ensure security and compliance by reducing the risk that a virtual machine might migrate to a hypervisor with a less secure networking configuration. In addition to simplifying the virtual machine management process and improving IT productivity, effective virtual machine management benefits organizations by significantly reducing barriers to virtualization.

Greater IT Productivity Through Infrastructure Convergence

Cisco UCS enables greater server virtualization, dramatically reducing the number of servers that organizations require. In many traditional systems, it has become common practice to have multiple network interface cards (NICs), host bus adapters (HBAs), and LAN-on-motherboard (LOM) network ports all connecting to different networks. This approach adds significant complexity to the network, not just between Ethernet and Fibre Channel networks, but between multiple versions of each network (management, connectivity, backup, etc.). Cisco Unified Fabric, the networking foundation of the Cisco Unified Data Center, however, significantly simplifies the data center network by using Fiber Channel over Ethernet (FCoE) to converge previously separate LANs and SANs onto a single network. Whether you choose to converge onto Ethernet or just reduce the number of Ethernet and Fibre Channel connections per server, Cisco Unified Fabric dramatically simplifies the overall topology. This

² Principled Technologies Test Report, Blade Manageability Comparison: Cisco UCS Solution vs. HP ProLiant Solution

convergence significantly reduces the total number of switches, NICs, HBA ports, adapters, and cables that an IT staff must deploy and maintain.

Converging management environments offers another potential opportunity to improve IT productivity. Cisco Prime™ Data Center Network Manager (DCNM) provides a single tool for managing an organization's existing SAN and FCoE systems. By reducing the number of components and management environments, organizations can also lower the staffing costs associated with deployment, management, and training. By consolidating the LAN and SAN environments, existing IT staff has an opportunity to increase the staff's skill base.

Increased Operations Efficiency with Common Network Operating System

In contrast to traditional data centers, which have multiple operating environments to manage, Cisco Unified Fabric uses the Cisco NX-OS Software operating system, which acts as a single operating environment that runs across every element of the data center network. In the Cisco Unified Data Center, Cisco NX-OS extends from the unified fabric to the server, network, and storage systems. (The Cisco NX-OS platform supports the entire Cisco Nexus® Family and Cisco MDS 9000 Family product lines and is the base operating system for the Cisco UCS 6000 Series Fabric Interconnects.) The common OS creates a single environment that uses the same operations and the same training.

Standardizing Processes and Services across the Enterprise

Standardization of processes and services is the next main factor in achieving significant improvements in IT staff productivity.

Standardization is a vital prerequisite to automation that requires a definition of established processes for a given task to deliver services per device. One important element for which standardization is required is scripts, which may need to be rewritten to comply with a set of standard processes. Without standardization of processes, variations in deployments will result in hidden costs as well as availability and performance problems.

Service offerings also need to be standardized. Although the range of service options is broad, every new service needs to be planned, designed, implemented, and supported by IT staff. Standardization of service processes reduces the potential for inefficiencies that waste IT's time and continue the underutilization of IT resources.

How the Unified Data Center Facilitates Process and Service Standardization

The Cisco Unified Data Center simplifies architectures and processes through the integration of computing, networking, storage, and virtualization layers, resulting in fewer steps to implement a task. Fewer steps to implement a task mean fewer steps to standardize it. Simplified scalability, higher virtualization ratios, and converged architectures also streamline the design and deployment of services that run on the architecture, facilitating the service standardization process.

NATIONAL FFA

- Decreased time to provision new server resources from 5 days to 20 minutes

The next step in the simplification process is to create templates, or "golden images," of configurations: for example, of Microsoft Windows 7 server environments. Templates define repeatable processes that Cisco Intelligent Automation for Cloud uses to

orchestrate new virtual instances automatically without the need for human intervention. When patches or changes need to occur, the IT administrator simply clones an existing template, applies the appropriate patch or change, and then republishes the template for use. The efficiencies from this process include:

- Reduced training costs within IT and more resources to focus on strategic priorities, because the organization has fewer operating environments and types of hardware to support

TRAVELPORT

- Reduced total rack, cabling, server, and network costs by 800%
- Saved 86% in total support hours

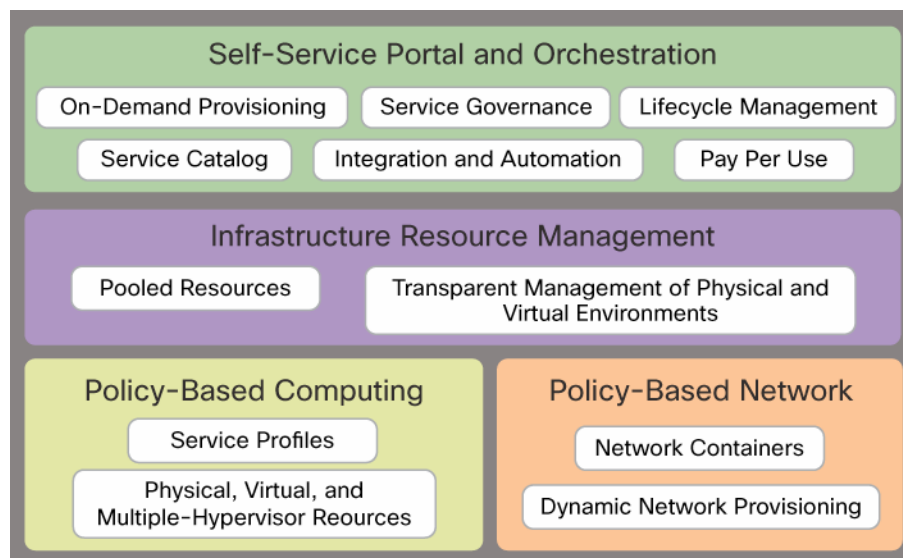
- Increased compliance and improved data center availability and performance by essentially eliminating the potential for human error

Improving Productivity and Business Agility with Automation

In a recent study conducted by industry analyst ESG³, chief information officers (CIOs) considered the following to be their top priorities, in the order listed here, when justifying IT investments to their management team over the next 12 to 18 months:

1. Reduced operating expenses
2. Improved business processes
3. Increased ROI and faster payback
4. Improved security and risk management Cisco Intelligent Automation for Cloud (Figure 2) allows organizations to accomplish each of these objectives by providing self-service ordering from a menu of standardized services and then automatically provisioning the services according to the customer's unique requirements. Automation of physical and virtual resources increases IT productivity and resource utilization and the flexibility and agility of IT services. As a result, IT is better able to align with the needs of the business. The building-block approach of Cisco Unified Management, in which each building block incorporates intelligence about standardized processes and services:
 - Starts with Cisco UCS Manager for policy-based infrastructure provisioning of computing resources, whether physical or virtual
 - Uses Cisco Network Services Manager (NSM) for policy-based dynamic network provisioning
 - Implements Cisco Intelligent Automation for Cloud to provide a self-service portal, a service catalog, and orchestration to implement anything as a service (XaaS)

Figure 2. Cisco Intelligent Automation for Cloud



³ Enabling IT as a Service, ESG, 2011

Policy-Based Computing

Cisco UCS Manager enables computing automation that yields tremendous productivity gains in configuration and maintenance activities for virtual and physical servers while generating significant advances in business agility. A few examples of the productivity-enhancing intelligence built into Cisco UCS Manager include:

- Automated configuration with Cisco UCS service profiles
 - **Standardized configurations:** One of the unique advantages of Cisco UCS is that all the configuration information is placed in a service profile, which can be used for a specific blade or made into a template and applied to multiple servers. Organizations can create different profiles for different services requiring different configurations. For example, a profile for a web server may have a specific network or firmware configuration, because the applications that reside on that server depend on specific firmware or RAID storage. A database server may use different applications with different dependencies. Service profiles help ensure that servers are configured in a standard way.
 - **Faster configuration:** In the past, installation and configuration were considered two separate steps, but with Cisco UCS Manager, these steps can be combined, streamlining the process and improving the time-to-market for that server. With profile- or template-based configurations, the identity of the server is decoupled from the hardware, so organizations can preconfigure a server before it is ever turned on. When the server is turned on, it comes up with the preprogrammed identity: the server is running in minutes instead of the days or weeks previously required, and it is doing the job it was purchased for sooner. After profiles are predefined, a junior-level employee can apply a service profile template to a blade to create a new service, allowing senior-level staff to focus on more strategic projects.
 - **Simplified management:** The definition and configuration of service profiles can be performed completely through programmatic mechanisms. With this feature, Cisco UCS Manager also enables customers to incorporate physical elements into their cloud delivery solutions, so customers can use a single tool regardless of whether organizations want to deliver cloud services on physical or virtual infrastructure.
- Automated maintenance activities
 - **Management of server firmware and BIOS releases:** Organizations with large data center environments tend to forego server maintenance as much as possible because of the time and resources required. For instance, management of server firmware and BIOS releases typically requires a reboot of the server, making implementation of updates such as new security releases a time-consuming, expensive, manual, one-blade-at-a-time process. Because Cisco UCS servers are all connected through a common management plane, however, the process for updating firmware and BIOS software is efficient and easy. When Cisco UCS Manager is updated, the update package includes all the latest BIOS and firmware releases. Organization can even preset the update so that the next time any Cisco UCS server is booted worldwide, the latest firmware and BIOS upgrades are installed. Automation of this common practice can be performed on Cisco UCS servers with little downtime and provides significant benefits in IT staff productivity.

EURONET

- Time for virtual server implementation, provisioning decreased by 90 percent

SEVEN CORNERS

- Provisioned compute resources in seconds, not weeks
- Supported double digit growth without increasing staff

- **Automated configuration changes:** Separation of the profile from the server identity also enables automated configuration changes. For instance, if a server is running out of memory, Cisco UCS Manager moves the identity to a server with more memory. Similarly, if the server requires more CPU power, Cisco UCS Manager can move it from an 8-CPU system to a 16-CPU system, and the only downtime would be the time to reboot. In

addition to being faster, this process requires significantly less administrative overhead, because staff no longer needs to perform configuration steps such as rerunning cables and verifying that the network configuration for the server is set up correctly. This additional agility helps improve business continuity and an organization's ability to meet service-level agreements (SLAs). Open APIs to preserve investment in management systems: All Cisco UCS Manager capabilities are exposed through an open API, allowing system administrators and application developers to programmatically manipulate the infrastructure for Cisco UCS. This capability lets organizations choose whatever management platform they want to use while still getting the benefits of Cisco UCS Manager.

HAMILTON CLEARMONT COOPERATIVE ASSOCIATION

- "With application performance enhancements, what used to take 10 minutes now takes 10 seconds."

Policy-Based Network Services

Until recently, IT departments have relied on individual device management to deploy network services in the data center. With device management tools, automation of today's complex networking layer, which includes switches, routers, and load balancers, can occur only if scripts or templates are developed to patch together the networking layer. This approach is time consuming and resource intensive and does not scale well. Patching or changing this environment requires the involvement of multiple people (who may or may not be part of the organization) as well as finding the appropriate people with the administrator passwords. The potential for human error is high with this process. Cisco NSM adds the power of standard network services processes and a network services catalog to the IT department's automation toolkit. By applying a layer of abstraction, it allows the IT department to look at all facets of the network involved, not as individual devices but as a single system. Cisco NSM automates every phase of the network services lifecycle, transforming the productivity of the network staff.

Automating the Creation, Change, and Teardown of Network Services

Instead of developing network services on an as-needed basis, organizations implementing Cisco NSM start by developing their desired virtual data center service delivery structure to assemble their network services catalog. The interface makes it easy to select the combination of service options (basic Internet, VPN, internal firewalls, load balancing, etc.) for each service. After the portfolio of network services is complete and system access levels identified, the services can become part of the organization's service catalog. After a network service is developed, it can be used repeatedly through the template process described earlier. IT simply provisions a new network service by dragging and dropping the appropriate service on the tenant, and then validates the configuration.

IT departments can build on the benefits of Cisco NSM with a range of portal orchestration solutions by using the open Cisco NSM API. For instance, solutions like BMC Cloud Lifecycle Manager or Cisco Intelligent Automation for Cloud do not have to know about the network devices that are being used; they simply need to use the open Cisco NSM API to view the range of network services that can be established for their architecture, accelerating the introduction of new services to market.

Changing a network service is as simple as modifying the container assigned to each tenant and automatically propagating the modified container to all network services for the specific tenant. In addition to conserving the time

of valuable IT resources, the tenant gets the benefit of the change faster in accordance with prescribed IT governance and compliance rules.

IT departments benefit from similar productivity savings when tearing down network services. In the past, if a tenant service was no longer required, a skilled employee was needed to disassemble the script and tear down the service, one device at a time. In contrast, with Cisco NSM, a network service can be torn down automatically with just a few clicks, simultaneously freeing all related IT resources for reuse.

The more frequently that an organization creates, changes, or tears down a network service, the greater the productivity and economic gains. There are costs associated with the setup of standardized network services, but organizations have found that they can sometimes offset the setup and Cisco NSM software costs with just a few projects. For instance, when Cisco first began using Cisco NSM in a lab environment, the network team was asked to use Cisco Catalyst® 6500 Series data center switches in the initiative. The team was able to set up in one day and start implementing and automating some network services for the lab. The team was then asked to modify the physical topology, replacing the Cisco Catalyst 6500 Series Switches with Cisco Nexus 7000 Series Switches. If the team had been using the management software that had been installed previously, which was based on workflow processes, it would have required a three-phase process spanning several months. Instead, by using a model-based approach to network management, the team was able to connect the Cisco Nexus 7000 Series systems and make updates to data paths in just a few hours.

Looking Ahead: Increasing Frequency of Network Service Creation and Change

In the past, because the process of creating, changing, and tearing down network services was resource intensive, IT departments viewed it as a necessary maintenance activity, not as a potential competitive differentiator. As cloud-based offerings become more mainstream, however, the capability to dynamically bring up, change, or tear down a network service can become a high-value service offering in itself. For this reason, companies interested in pursuing a cloud strategy are likely to see increased requests to deliver differentiation through network services, providing them with an additional incentive to make the process a core competency.

Achieving the Economic Value of Cloud Computing

Cloud-based computing has emerged as the solution that IT needs to become flexible and agile while providing the resources necessary to make services available to users and meet the demands of today's infrastructure. Starting with a private cloud, organizations can automate IT to deliver end-to-end services to users within minutes instead of weeks. In the event that the organization needs additional computing power, the company can burst out from its private cloud to public cloud environments to obtain additional computing and storage capacity to meet its business needs. Cloud management delivers the following benefits:

- Increased agility and flexibility for IT infrastructure resources, scaling out or down within minutes: Enables IT staff to focus on strategic projects that move the organization forward rather than focusing on mundane maintenance tasks and processes
- Increased availability of IT resources through the automation of best practices and infrastructure reporting: Improves operation efficiency and compliance by automating domain knowledge, best practices, and analytics and transforming them into repeated processes triggered by policy and defined events

Cisco Intelligent Automation for Cloud delivers these capabilities through a unified management solution that provides single-pane manageability for a cloud environment. Cisco Intelligent Automation for Cloud provides advanced automation and orchestration for virtual and physical infrastructure across computing, network, storage,

and application domains. Cisco Intelligent Automation for Cloud significantly reduces the cost, complexity, risk, and time-consuming manual steps required to define, order, provision, configure, and manage the lifecycle of cloud services. The organization benefits from:

- Self-service portal and orchestration to deliver IT resources on demand
- Physical and virtual resource provisioning to significantly reduce time-to-value
- Subscription and lifecycle management to reduce server sprawl
- Role-based consolidated administration and management through dashboards to proactively address potential problems before they affect the organization

Two foundational pillars form the basis of successful cloud initiatives, and Cisco Intelligent Automation for Cloud provides both:

- Web-based self-service portal
- Automation and orchestration platform

Cisco Intelligent Automation for Cloud distinguishes itself from other solutions by:

- Reducing TCO by allowing customers to purchase only what they need today and to expand their system as their business grows
- Providing more than 90 predefined workflows and process templates based on best practices, with the capability to customize these workflows and templates with easy-to-use tools if required
- Enhancing coverage and flexibility with an industry-leading service catalog with ITIL support, governance policies, and open portlet integration; Cisco Intelligent Automation for Cloud works with any hardware and virtualization product, protecting current investments
- Enriching the user and administrator experience with an industry-leading interface that mirrors the shopping cart e-commerce experience and is easy to configure and operate; detailed automation summaries keep administrators in control and accountable

All facets of Cisco Unified Management combine to deliver significant economic savings for IT departments. Table 1 presents some examples that show how the simplified architecture, standardized processes, and automation of the Cisco solution combine to deliver quantifiable benefits.

Table 1. Economic Benefits of Efficient Use of IT Staff and Technology Resources

- **IT staffing savings** from both the initial provisioning setup and ongoing operations
 - **Provisioning setup:**
 - IT staff time savings associated with self-service, quotes, and management, as well as business user cycle time reduction from employee self-service of IT
 - **Lifecycle management** with governance across both internal (for instance, private cloud) and external services
 - Fewer help desk tickets per year due to use of self-service and fewer full-time equivalent (FTE) staff hours involved in auditing, tracking infrastructure use, and cost allocation
 - Automation of subscription management audits and billing
 - Elimination of time and need to create service catalogs, perform tracking, and create reports
 - Reclaiming of capacity no longer needed, allowing the organization to immediately scale down and return resources to a general pool to optimize resource utilization

- **More efficient consumption of IT services**
 - **Reduced IT infrastructure consumption** as a result of improved governance, policy controls, cost visibility, and virtualization, including sprawl reduction and avoidance
 - **Savings in IT capacity**, enabling the organization to retire unused assets, make related reductions in space and in power and service contracts, and reduce the use of dedicated staff to maintain these assets
 - **Centralized control and governance, replacing** more expensive external cloud services with those that can be delivered through internal IT resources with prices that are preallocated and predetermined
- **IT training cost savings:** Intelligence that used to be required for manual process setup is now embedded the self-service provisioning tool.
- **Greater adoption of standardized services.** IT services standardization and rationalization can provide the greatest savings through reduction in the number of requests per year for custom-built infrastructure, and reduction in the FTE resources associated with each request.
- **Embedded tracking capabilities: Embedded capabilities** enable pay-per-use metering, whether an organization is using a simple showback approach or a chargeback approach.
- **Open APIs:** All Cisco management solutions are designed with open APIs to integrate with the most common third-party systems, allowing organizations to preserve and extend their investments in existing management tools.
- **Reduced IT staff turnover:** By freeing IT staff from routine maintenance activities to work on initiatives strategic to the business, organizations are likely to experience lower employee turnover.

In addition, organizations gain the advantages of greater agility that can ultimately have a profound effect on business economics (Table 2).

Table 2. The Economic Benefits of Greater Agility

- The capability to respond more quickly enables **faster provisioning of services that propel the business** and faster achievement of results from those initiatives.
- Scale not just for long-term growth, but also to **support the capability to burst applications or rent additional computing power for short timeframes** (go-to-market events, product launches, etc.).
- Reduce **integrated resource provisioning time from weeks or months to minutes**. Organizations can provision IT services on demand because policies have been preset; there are no delays to determine whether capacity is available or to seek budget. Cisco's IT department reduced the time required for infrastructure provisioning from six or eight weeks to enable employees to self-provision end-to-end IT infrastructure (including servers, storage, and networking) in approximately six minutes.
- **Reduce system downtime** (time when users are unable to access and work on servers) and the amount of time and effort required to return from downtime
- Gain the capability to **commit to more aggressive deadlines and SLAs** for customers, achieving a time-to-market advantage.

Converged Infrastructure: Improving the Productivity of Data Center Acquisition and Deployment

Organizations are also seeking ways to reduce the IT staffing costs associated with acquiring, designing, procuring, configuring, and testing new data center equipment. Converged infrastructure solutions offer a promising alternative. To that end, Cisco is partnering with storage vendors (EMC with the Virtual Computing Environment [VCE] Vblock™ Systems and NetApp with FlexPod converged offerings) and hypervisor vendors (VMware, Citrix, and Microsoft) to create highly flexible converged infrastructure solutions focused on enabling virtualized and cloud environments.

From an economic perspective, the rationale is that infrastructure that is purpose-built to handle very dynamic environments and eliminate the traditional infrastructure silos will help reduce the time needed to provision new services and reduce TCO.

When industry analyst IDC evaluated the potential TCO benefits of converged infrastructure solutions⁴, it performed a thorough cost analysis of the impact of Vblock systems with five large enterprise customers and revealed the following results:

⁴ Converging the Data Center Infrastructure: Why, How, So What? IDC 2012

-
- Prior to using converged infrastructure solutions, these customers spent an average of 23 percent of IT staff time purchasing, building, and testing data center infrastructure. By purchasing preintegrated and tested Vblock systems, they were able to reallocate these resources to other value-added activities.
 - These organizations achieved an average of 60 percent greater storage utilization and almost doubled their networking port utilization: a 93 percent increase compared to their system operations that did not use Vblock systems.
 - These customers reduced the number of server incidents from an average of 13.7 to 0.5 per year and reduced the associated user productivity losses by more than US\$9000 per 100 users per year. They achieved these results by using the systems':
 - Consolidated footprint, resulting in fewer sites, consolidated communication lines, and compressed networking
 - Less complex and integrated environment, resulting in fewer hardware and software incompatibilities and aging problems
 - Increased IT staff resources, because staff was freed from maintenance tasks, enabling the staff to focus on quality
 - The organizations reduced the average annual cost of their data centers by 68 percent (or from US\$130,000 to US\$42,000) per 100 users.

Looking Forward: The Impact of Closing the Virtualization Management Gap

The combination of simplified data center architecture, standardized tasks and services, and automated management and orchestration and services provisioning through Cisco Unified Data Center, as well as a potentially streamlined data center purchase and deployment process with converged infrastructure, provides IT management with powerful ways to fundamentally shift their staffing resources from maintenance to strategic activities.

Although most of this document focused on the direct economic benefits to IT staff, organizations can also anticipate a range of indirect economic benefits from improved management and administration. Perhaps the most significant benefit is removal of management complexity as a barrier to pervasive virtualization, which will help organizations move to cloud deployments and achieve better resource utilization. Cloud environments, in turn, can deliver optimized application performance and availability and greater business agility.

As IT is able to assign more of its most talented staff members to strategic tasks, it can continue its evolution from a cost center to an innovation center. By helping achieve more innovation and differentiation in today's always-on business environment, IT will become an even greater source of sustainable competitive advantage.

For More Information

<http://www.cisco.com/go/unifieddatacenter>

<http://www.cisco.com/go/unifiedmanagement>



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