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# Cisco UCS Integrated Infrastructure: Evolution and Focus Areas

August 2014

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## What You Will Learn

This document provides a high-level description of Cisco UCS Integrated Infrastructure, the foundation for a number of popular infrastructure-as-a-service (IaaS), private cloud, and enterprise application products. These integrated solutions include FlexPod with NetApp, Virtual Computing Environment (VCE) coalition Vblock™ Systems, Cisco Solutions for EMC VSPEX, and others. This document provides IT decision makers with context for the industry's shift to integrated systems, explains Cisco's approach, and briefly describes applications and use cases in which Cisco is investing in integrated infrastructure along with its ecosystem of application and storage technology partners.

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## Introduction

IT is rapidly shifting away from traditional silos. The past few years have seen the emergence of integrated, or converged, infrastructure, in which the full stack of data center technologies is combined into preengineered, tested, and supported systems designed to operate as a whole. The underlying reasons for this trend are three critical chief-information-officer (CIO) imperatives: IT is being tasked to reduce total cost of ownership (TCO), enhance revenue, and lower risk. The benefits of integrated infrastructure are highlighted in Figure 1.

### What IT Executives Expect

An IDC study indicates that IT executives anticipate 50 percent of computing, storage, and networking resources and workloads will run on integrated systems by the end of 2015. Customers that use integrated systems anticipate accelerated innovation and IT service agility with 20 to 30 percent improvement expected in the time to provision systems, as well as improved IT staff productivity and the utilization of infrastructure resources. They expect 42 hours can be saved by each IT administrator per month, and 40 percent anticipate needing less IT staff to support integrated systems.

Source: IDC Converged and Integrated Systems End-User Survey Report, August 2013

- CIOs recognize that operations—including people, management, software, and facilities—are the greatest cost in the data center, far greater than the cost of underlying hardware.
- The growth of mobility, social media, collaboration, the Internet of Everything (IoE), big data, emerging in-memory database technologies, and other scale-out applications that are needed to increase revenue require highly responsive and scalable IT infrastructure.
- Data centers are shifting toward heavily virtualized private, hybrid, and public cloud computing models running on industry-standard, commodity hardware systems. These environments require uniform design points that can be repeated for ease of management and scalability.

It is not surprising that these factors have led to the need for predesigned computing, networking, and storage building blocks optimized to lower the initial design cost, simplify management, and enable horizontal scalability and high levels of utilization. These systems are particularly valuable for many common and transitional application use cases described later in this document that demand a large amount of IT attention. Much of the integration is performed by vendors who can offer all three system elements, or through a partnership of vendors who each offer different pieces of a solution. In all cases, the primary intention is to make the whole greater than the sum of its parts.

### Cisco Survey Results

Cisco field research shows that 30 percent of customers are already focusing on integrated infrastructure as a standard deployment model, and 50 percent see value in using it for specific use cases.

Source: Cisco internal survey, March 2014

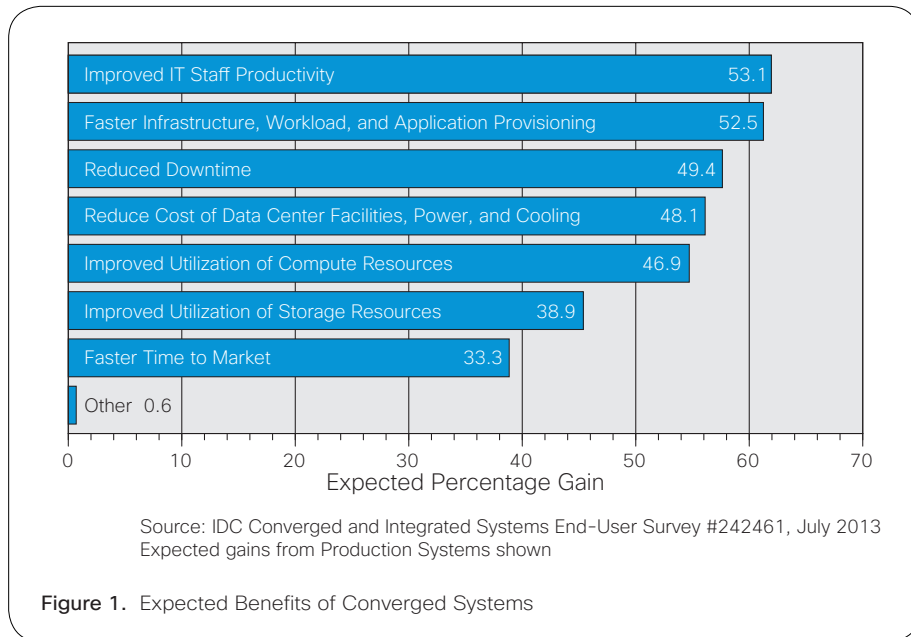
### On Deployment of FlexPod

“Our staff can now provision complete environments in minutes, not months, so we can test new ideas very rapidly. It’s given us a competitive edge.”

**Andrew Henderson**  
CIO, ING DIRECT Australia

“This FlexPod implementation lets us move from a standard virtualization play into a true private cloud infrastructure that enables faster allocation of resources to development teams and, in turn, faster rollout of customer-facing services.”

**Dave Templeton**  
CIO, Kelley Blue Book Company, Inc.



### Double-Digit Growth of Integrated Systems

Although the number of underlying IT server, network, and storage resources in the data center is still increasing dramatically, investment in these resources is relatively flat due to the reduced cost per unit. However, the number of integrated systems that package and deliver these traditionally separate components as a single solution is growing fast: in the double digits. The trend is strong enough that both Gartner and IDC have started to cover the integrated systems market. IDC forecasts that the integrated systems market will grow at a 5-year 2012-2017 compound annual growth rate (CAGR) of 32.8 percent, to US\$14.3 billion by 2017, up from US\$5.4 billion in 2013. In contrast, analysts expect the general-purpose IT market, which includes all server, storage, and networking components in nonintegrated systems, to grow at only a 4.2 percent CAGR during the same period.

While analysts differ slightly on the taxonomy and makeup of the various integrated systems that comprise this market segment, they agree that these systems include a combination of servers, networking resources, storage systems, management systems, convenient packaging, and holistic support.

### Evolution of Cisco UCS Integrated Infrastructure

Cisco is a core vendor in the integrated infrastructure systems market segment with integrated infrastructure systems built on top of Cisco Unified Computing System™ (Cisco UCS®), Cisco Nexus®, and Cisco UCS Director products. These systems offer the foundation for a number of popular infrastructure-as-a-service (IaaS) offerings, private cloud deployments, and enterprise applications.

Cisco saw the value enabled by integrated infrastructure systems when it launched Cisco UCS in 2009. In the past five years, Cisco has become a leader in the movement toward integration. The company recognizes that no single vendor can provide all the best building blocks for a complete solution, and that customers have deep competency and preferences for their suppliers.

Cisco and EMC led the way in creating the Virtual Computing Environment (VCE) coalition, initially as a joint technology program and then as a full-fledged spin-off company. VCE has become the world leader in converged infrastructure that is designed, purchased, packaged, delivered, and supported as prefixed building blocks.

With NetApp, Cisco built a broad portfolio of FlexPod reference architectures optimized for IaaS, private cloud, and common enterprise application workloads including Microsoft, SAP, and Oracle applications and databases.

Other system vendors have also chosen to build their integrated solutions on the same underlying Cisco data center platform: for example, the Hitachi Data Systems (HDS) Unified Compute Platform (UCP) Select program and the Nimble Storage SmartStack offering.

### Cisco's Approach to Integrated Infrastructure Design

Cisco provides a range of integrated system designs, including reference architectures (for example, FlexPod, and Cisco Solutions for EMC VSPEX), fully assembled stacks (for example, VCE VBlock™ Systems), and fully assembled appliances with applications preinstalled (for example, SAP HANA on Cisco UCS). The reference architectures are documented as Cisco Validated Designs published at the Cisco Design Zone. Cisco Validated Designs provide an architectural description of a solution along with detailed implementation instructions. Each design is the result of a rigorous process that includes requirements collection, design specification, review with an expert panel, and end-to-end validation in labs against real-world deployment configurations, as well as traffic-load, scaling, and failure scenarios and complete documentation in Cisco Validated Designs and other related collateral (Figure 2).

For more information, visit the [Cisco Design Zone](#).

Cisco engineers typically sort out 50 to 100 different Cisco and partner product releases and hundreds of configurations to optimize Cisco UCS Integrated infrastructure. Their efforts ultimately translate into reduced cost and time for design and deployment.

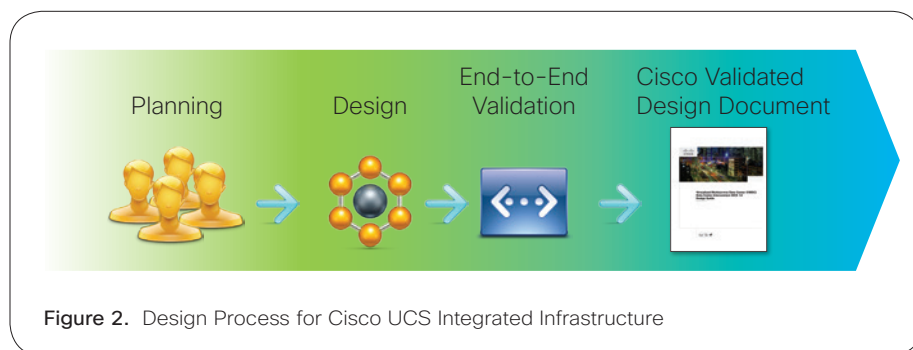


Figure 2. Design Process for Cisco UCS Integrated Infrastructure

In addition to design excellence, Cisco provides the option of single-number support for many of the Cisco UCS Integrated Infrastructure-based systems through its Technical Services organization, giving customers a single accountable support structure for all design components.

## Baseline Platform

For more information visit the [Cisco Unified Data Center](#) page.

The foundation for all Cisco UCS Integrated Infrastructure designs is the Cisco Unified Data Center, which combines Cisco's computing, storage, networking, management, storage access, and security solutions into a unified and cohesive platform that is designed to automate IT as a service (ITaaS) across both physical and virtual environments. The unified data center includes the recent additions described here.

### Cisco UCS Director

For more information, visit the [Cisco UCS Director](#) page.

Cisco UCS Director unifies and automates end-to-end IT converged infrastructure management processes by abstracting the complexity of individual devices, hypervisors, and virtual machines, and automating end-to-end IT converged infrastructure management processes in a unified and easy-to-use set of tools and interfaces. Using Cisco UCS Director, integrated infrastructure designs can be further simplified to enable easy, turnkey deployment and operation.

### Cisco Application Centric Infrastructure

For more information, visit the [Cisco Application Centric Infrastructure](#) page.

Cisco Application Centric Infrastructure (ACI) is a holistic architecture with centralized automation and policy-based application profiles that deliver software flexibility with the scalability of hardware performance for Cisco Unified Fabric. The architecture consists of the Cisco Nexus® 9000 Series Switches, Cisco Application Policy Infrastructure Controller (APIC), and Cisco Application Virtual Switch (AVS). Together, these components provide a highly flexible and reliable hardware and software foundation for a data center fabric, achieving the promise of software-defined networks (SDNs) while maintaining the quality and reliability of Cisco's hardware networking solutions.

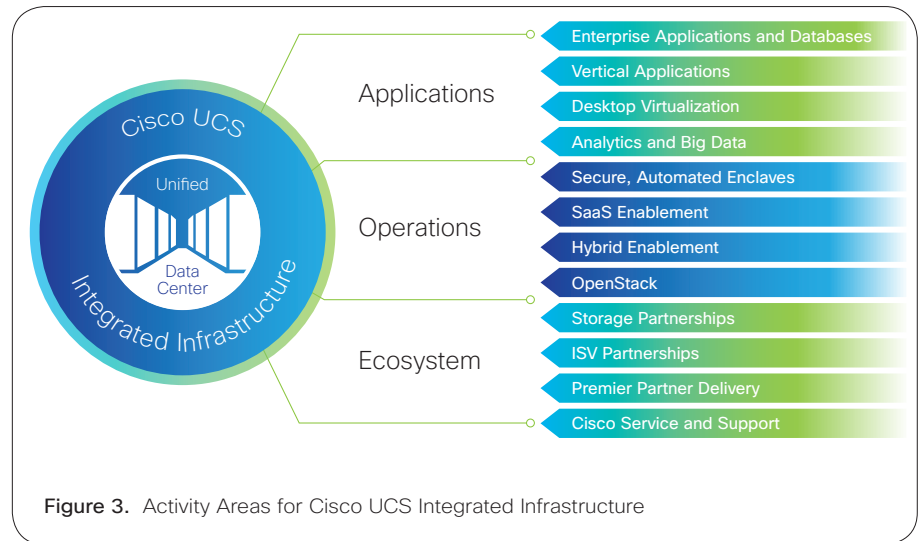
### Cisco Intercloud Fabric

For more information, visit the [Cisco Intercloud](#) page.

Cisco Intercloud Fabric enables secure, open, flexible, and easy-to-manage solutions that foster freedom in workload placement based on business needs. Cisco Intercloud Fabric helps ensure easy and complete coherence and consistency of network security, quality of service (QoS), and access control policies in private, public, and hybrid cloud deployments. With Cisco Intercloud Fabric, customers can have confidence in the integrity and security of their workloads as they move between private clouds and public clouds.

## Activity Areas

Cisco's solution engineering teams focus on three high-level areas of activity and a series of programs to help ensure that integration efforts are relevant to specific customer use cases and business outcomes (Figure 3). Most integrated infrastructure systems include elements from all three areas, and all designs are built using generally available platforms and features to help ensure immediate market relevance and usability.



### Applications

Focusing on the industry's most common data center applications as well as the more demanding application and technology transition points such as in-memory databases and big data and analytics, Cisco aims to deliver the best performance and quality of experience for commonly used enterprise and industry-specific vertical applications and databases. Topics addressed include application-specific performance and design, heavy-load and destructive testing to help ensure high levels of capability and resiliency, and the capability to run both virtualized and bare-metal systems and make strategic use of flash-memory acceleration to enhance application performance.

### Operations

Operation efficiency and reduced TCO are important focal points of Cisco UCS Integrated Infrastructure solutions. Activities in this area include aligning the latest system technologies across the full IT technology stack into predesigned building blocks, automating deployment and ongoing management processes, supporting the optional secure separation of workloads inside building blocks, and enabling software-as-a-service (SaaS) and hybrid deployment models. Open and standards-based APIs on Cisco platforms facilitate ease of integration with a multitude of partner platform and management software, providing design flexibility, helping ensure that the solution will continue to address customer needs into the future, and enabling easy upgrade and maintenance processes.

### Ecosystem

Cisco works closely with its partners to design integrated systems that combine the best and newest technologies available. Activities include joint solution engineering across all layers of the stack and joint delivery and support through the multitier distribution channel. These joint solutions effectively provide hundreds of years of combined expertise in each design. Furthermore, Cisco provides the option for single-number support with accountability for trouble ticketing of many of its Cisco UCS Integrated Infrastructure solutions.

## Application-Related Programs and Use Cases

### Enterprise Applications and Databases

Cisco works with partners on a broad range of prevalidated solutions for enterprise applications and databases. These solutions are available on almost all systems based on Cisco UCS Integrated Infrastructure, such as VCE Vblock Systems, FlexPod, Cisco Solutions for EMC VSPEX, HDS UCP Select, and Nimble Smart Stack.

For more information, visit  
<http://www.cisco.com/go/oracle>.

For more information, visit  
<http://www.cisco.com/go/sap>

For more information, visit  
<http://www.cisco.com/go/flexpod>  
and <http://www.cisco.com/go/vspex>.

For more information, visit  
[http://www.cisco.com/web/partners/partner\\_with\\_cisco/isv\\_resources.html](http://www.cisco.com/web/partners/partner_with_cisco/isv_resources.html).

For more information, visit  
<http://www.cisco.com/go/vdi>.

- **Oracle database and applications:** Cisco works directly with Oracle to validate Oracle Linux, Oracle Virtual Machine (OVM), Oracle Real Application Clusters (RAC), and the Oracle NoSQL Big Data database on Cisco UCS for application-level solutions, including Oracle E-Business Suite, Oracle Peoplesoft, Oracle JD Edwards, Oracle Siebel, and other Oracle enterprise applications.
- **SAP databases and applications:** Cisco is working with SAP to enable Cisco ACI capabilities in SAP landscapes. It also supports SAP HANA, ASE, and IQ databases as well as the complete SAP portfolio of business solutions (including Enterprise Resource Planning [ERP], Customer Relationship Management [CRM], and SRM), cloud solutions (SuccessFactors), and mobility solutions (Afaria). In addition to supporting a full range of SAP HANA appliances, Cisco worked closely with SAP to enable the deployment of SAP HANA on existing network infrastructure within SAP HANA Tailored Datacenter Integration (TDI). Cisco also developed a new cloud cell architecture being used by SAP and service providers to deliver SAP HANA IaaS. The cloud cell architecture benefits from Cisco UCS Director as well as Cisco IT process automation for SAP (IT-PA) to enable automated orchestration of multi-SID SAP HANA systems.
- **Microsoft private cloud and applications:** Cisco UCS Integrated Infrastructure solutions support Microsoft Private Cloud Fast Track and top applications including Microsoft SQL Server, Exchange, and SharePoint. These solutions benefit from Cisco's deep integration between Cisco UCS and the Microsoft System Center management platform, enabling Microsoft System Center to monitor and manage almost every aspect of Cisco UCS Integrated Infrastructure.

### Vertical Applications

For independent software vendors (ISVs), the move to the cloud model is a given. Cisco has a deep focus in the areas of healthcare and service-provider applications and is expanding to other areas according to customer and ISV partner demand. The company runs an interoperability verification testing (IVT) lab tasked with helping ISV partners validate their technologies on Cisco UCS Integrated Infrastructure.

### Desktop Virtualization

Cisco UCS Integrated Infrastructure makes it easy to deliver virtualized desktops and applications with simplicity, scalability, and a superior user experience. Cisco and its ecosystem partners have developed a comprehensive portfolio of reference architectures that offer clear guidance for desktop virtualization deployments. These Cisco Validated Designs focus on on-board, simplified, and scalable architectures as well as converged infrastructure solutions for desktop virtualization.



For more information, visit <http://www.cisco.com/c/en/us/solutions/enterprise/design-zone-data-centers/secure-integrated-infrastructures.html>.

For more information, visit <http://www.cisco.com/c/en/us/products/switches/intercloud/index.html>.

For more information, visit <https://cdn.cisco.com/web/partner/home> and <https://cdn.cisco.com/web/partner/ivtpublic>.

For more information, visit <https://cdn.cisco.com/web/partner/home> and <https://cdn.cisco.com/web/partner/ivtpublic>.

## Operations-Related Programs and Use Cases

### Secure Automated Enclaves

CIOs often ask about security when considering cloud deployments. Cisco secure enclave designs enable a set of simplified yet highly secure offerings for integrated infrastructure. With these designs, partners and customers can easily build securely separated resource pools on top of existing integrated infrastructure deployments. In addition, Cisco UCS Director brings together all necessary components under a single automation and management framework, enabling single-pane management for all components.

### SaaS Enablement

SaaS deployments require the underlying infrastructure to deliver a comprehensive set of capabilities, including creation, allocation, and management of scalable resource pools that can be securely separated, and activation and on-boarding of the overlay application to be served in each pool. Cisco works with partners to deliver SaaS acceleration solutions, such as the Cisco UCS with NetApp Storage for SAP HANA and Cisco UCS with EMC Storage for SAP HANA solutions.

### Hybrid Enablement

Cisco UCS Director can deploy and manage virtual machines that reside on both on-premises and remote infrastructure. As a result, Cisco UCS Integrated Infrastructure solutions that use Cisco UCS Director provide baseline hybrid capabilities by default. In addition, Cisco Intercloud Fabric enables establishment of secure connectivity and coherent sharing of security policies between private and public cloud environments. Integration of Cisco Intercloud Fabric with Cisco UCS Director provides an easy-to-manage, open, and flexible environment in which security, QoS, and access control policies that were previously enforced in the data center are also enforced in public clouds. As capacity is added, there is no distinction between internal and external cloud resources.

## Ecosystem-Related Programs and Benefits

### Strong Storage Partnerships

Cisco supports a broad and robust set of storage partnerships, ranging from engagements with premier partners such as NetApp, EMC, and HDS to emerging and innovative smaller companies that offer various aspects of storage subsystems. Cisco helps storage partners easily and effectively integrate their solutions with Cisco's computing and networking solutions. To aid this effort, Cisco provides resources for interoperability validation through the Cisco Solution Partner Program and the Cisco Interoperability Verification Testing (IVT) Program.

### ISV Partnerships

Cisco works with ISVs that want to integrate their solutions with systems based on Cisco UCS Integrated Infrastructure. These application-level integration engagements are usually carried out with Cisco, the ISV, and a storage partner. These integration efforts can range from simple interoperability validation to complex SaaS acceleration initiatives.

For more information, visit  
<http://www.cisco.com/c/en/us/solutions/data-center-virtualization/flexpod/index.html> and <http://www.vce.com/products/vblock/overview>.

### Premier Partner Delivery

Cisco has a deep heritage working with thousands of consulting and reseller partners worldwide to deliver its products to end customers. In the case of Cisco UCS Integrated Infrastructure, the company has trained many of its partners on the various solution options including fully integrated designs and reference architecture systems to provide a wide range of flexibility for end customers.

### Cisco Service and Support

Unified solution-level support is a critical offering for all solutions based on Cisco UCS Integrated Infrastructure. This program enables the Cisco Technical Assistance Center (TAC) and partner support teams to provide single-number support for customers of the joint solution.

### Conclusion

Rapidly changing business priorities create challenges for CIOs. As more companies seek to deploy increasingly complex and distributed IT infrastructure that spans private, public, and hybrid clouds, CIOs can benefit from a new way of deploying their IT systems. Solutions based on Cisco UCS Integrated Infrastructure are the next step in the evolution of the data center. Consisting of prevalidated and tested components from Cisco and partners, these solutions deliver workload optimization and simplify the design, deployment, and ongoing management of business-critical systems. By evolving the data center with integrated infrastructure, enterprises can deploy and scale applications faster to drive the revenue side of the business while reducing risk and TCO at the same time.

### For More Information

- For more information about Cisco UCS Integrated Infrastructure, visit <http://www.cisco.com/c/en/us/solutions/data-center-virtualization/ucs-integrated-infrastructure/index.html>.
- For more information about Cisco UCS, visit <http://www.cisco.com/go/ucs>.



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