

Cisco IT Takes Continuous Delivery from Vision to Reality



Cisco IT Insights

What

Agile. Nimble. Relevant. Strategic. Cost efficient. Service provider. Service orchestrator. Take your pick. IT organizations are expected to be all of these things and more. Challenged with constrained budgets, shadow IT fallout, the dizzying pace of industry and technology game changers, IT is still expected to be both a source and facilitator of innovation, driving efficiencies and ready to turn on a dime when their company forays into new markets or goes on the competitive offense. Taking months to roll out a new application – be it software, a product, or a service – is no longer an option. This unforgiving climate compels a new model for IT. Cisco calls this new model Fast IT.

Fast IT simplifies operations at a time when complexity is mounting and budgets are flat. Through automated, programmable, and adaptive infrastructure, Fast IT frees IT organizations from manual configuration, changes, and maintenance. A key to Fast IT is continuous delivery. Continuous delivery extends Agile, continuous integration, and DevOps practices and tools to transform the way software and applications are deployed and delivered.

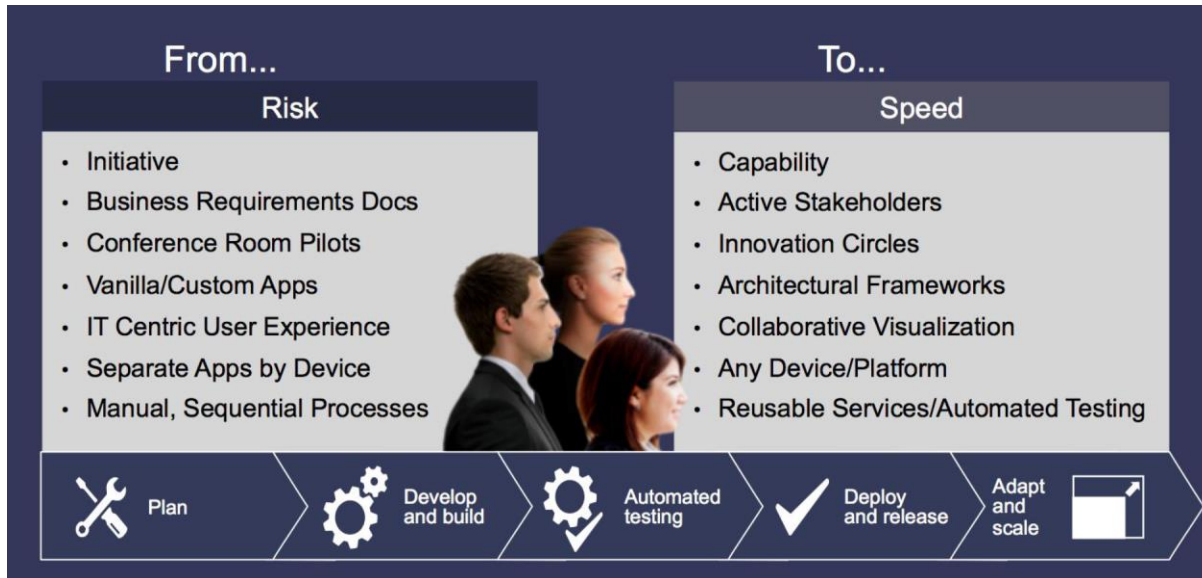
Today, Cisco IT is building on Agile methodology to further simplify and streamline software and product development and service delivery. Our journey to continuous delivery is fueled by three main objectives:

- **Accelerate time to capability**
 - Ensure active stakeholder involvement
 - Improve business agility
 - Enable IT to keep pace with the rapidly evolving market, changing business needs, and user demands
- **Improve software quality**
 - Automate testing and quality control
 - Reduce defects and incidents
 - Increase business availability
 - Embed quality assurance
- **Optimize delivery cost**
 - Work in smaller, more efficient teams
 - Enable an adaptive infrastructure for distributed applications
 - Support self-service
 - Reduce total cost of ownership
 - Implement end-to-end methodology

A successful continuous delivery model requires culture and mindset shifts across all of IT and the business (see Figure 1). Continuous delivery shatters the phase-based, sequential approach to application development, where specialized groups complete the work in phases. Each phase is sequential and depends on the one that came before it. Groups work in silos with little communication between them. What's more, this approach assumes that every business requirement can be identified before any design or coding occurs.

In contrast, regular IT-business collaboration is vital to a continuous delivery model. Business stakeholders must be engaged early and often. An efficient feedback loop that supports iterations in real time is also critical.

Figure 1. Continuous Delivery Culture/Mindset Shift



“The transformation to continuous delivery is a combination of process changes, the culture and mindset shift itself, and facilitating those changes with the proper platform and tools that enable automation,” says Arun Paramadhathil, Distinguished Engineer, IT, at Cisco. “From a technology standpoint, we needed a solution that couples application requirements to the underlying infrastructure.”

Starting in 2014, we began applying continuous delivery practices to 80 business-facing services, both Enterprise Resource Planning and non-ERP. We’re moving in three adoption waves. Wave 1 consists of 23 services that traverse all of IT, have large interdependencies, and follow the quarterly Enterprise Release Management Office (ERMO). These services fall into the buckets of Cisco® Commerce, Supply Chain, Customer Care, Collaboration Platforms, and Software Enablement.

“We could learn and glean best practices from handling these services first,” says Paramadhathil. “By doing so, we paved the way for things to become progressively easier in the subsequent adoption waves.”

The second and third waves entail 38 and 19 business services, respectively.

Why

A fast-moving industry and our strategic imperative to foray into new, complex business models mandate agile and Fast IT. To protect our long-term ability to operate and grow confidently with speed and scale in this dynamic landscape, we had to make transformational changes in the time to deliver capabilities, costs incurred, and outages in production that impact business.

Several open source technologies – from source code management, to continuous integration, to test automation, to continuous deployment – are now available and integrate well with each other. And these technologies have been validated by several web-scale companies within the industry, providing corroboration for traditional enterprise IT companies to follow suit.

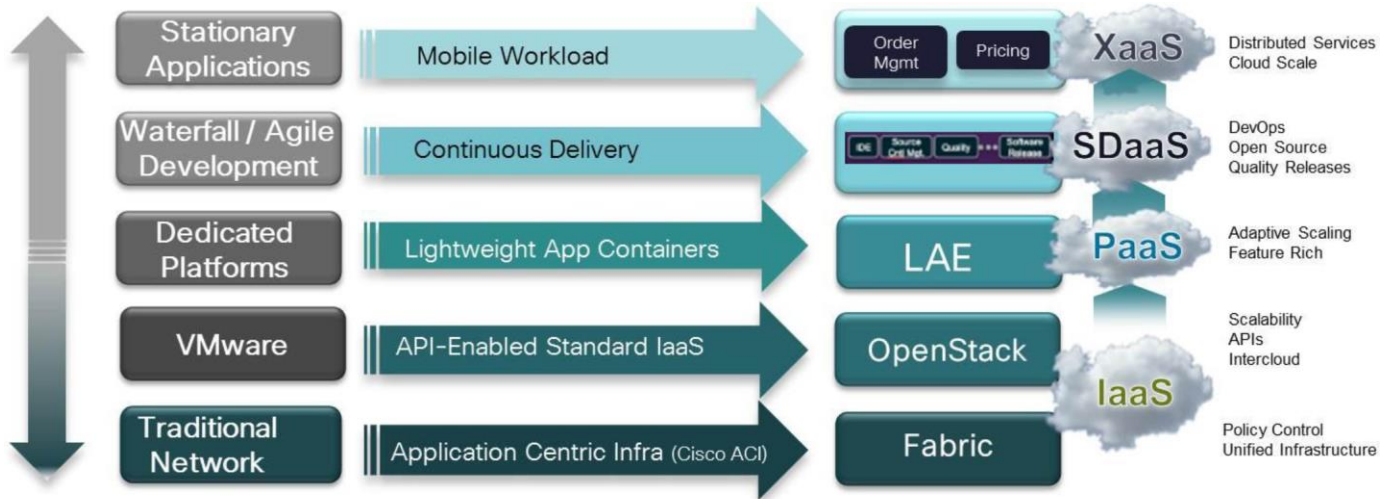
How: the Application-Centric Cloud Stack

Cisco IT Elastic Infrastructure Services (CITEIS), our private cloud solution, is the foundation for a flexible, application-centric cloud stack that is based on open source and is completely API-driven (see Figure 2). CITEIS has two primary service delivery modes:

- Infrastructure as a Service (IaaS) provides centralized compute, storage, and networking resources.

- Platform as a Service (PaaS) builds upon IaaS by delivering a complete environment for application hosting, development, testing, and deployment.

Figure 2. Application-Centric Cloud Stack



In the cloud stack, IaaS and PaaS are layered on top of a Cisco Application Centric Infrastructure (Cisco ACI™) within the data center, which is managed as a single, unified fabric versus managing individual components. In this layer, the network is transformed into a programmable, application-aware infrastructure that self-configures according to the needs of applications. OpenStack natively exposes the APIs, allowing compute, storage, and network resources to be dynamically provisioned instead of manually updated.

“Continuous delivery requires a level of agility in which applications can run in any cloud provider of choice, whether public, private, or hybrid. Workloads should be able to move from provider to provider,” says Paramadhathil. “Of course, each of the transformation changes within the application-centric cloud stack can exist independent of each other. But, the true value is realized when they co-exist and seamlessly integrate with each other.”

Moving up the cloud stack is the PaaS layer and our internal Lightweight Application Environment (LAE). LAE is a robust platform for teams to manage their applications and web services throughout the lifecycle – from development, staging, and load testing to production deployment. It supports common development languages such as Java, PHP, Python, Ruby, and Perl. We call LAE “lightweight” because the ordering and provisioning processes place light demands on developers. So they can focus on application coding and testing, not on the underlying infrastructure or platform.

LAE is a highly flexible environment. Developers can choose the composition and grouping of applications, and how applications are distributed across data centers for resiliency. They can define their own application lifecycles and follow a continuous integration model as they build and deploy application components. This application environment scales dynamically when resource demands increase.

On top of the PaaS layer is Software Development as a Service (SDaaS), which is integral to our current continuous delivery rollout. SDaaS gives developers on-demand access to the infrastructure, operating system, middleware, and system functions they need to develop applications end to end, from source control to build and review to deploy, without manual provisioning by Cisco IT.

All the needed resources are delivered within minutes after the developer orders them via Cisco's internal online services catalog called eStore. SDaaS is our answer to the one-click development stack. A typical scenario goes something like this:

1. Developer downloads the applicable Integrated Development Environment, or IDE. The IDEs are preconfigured with plug-ins and are fully tested. Teams have the flexibility to create custom profiles to suit their needs.
2. Developer then selects the infrastructure components required to develop the application end to end: from source control, to continuous build, to automated tests, to deploy and release. Framework templates in eStore have predefined components, some add-on or optional, appropriate for development using that framework.
3. Within minutes, the application development stack is fully configured and ready to use.

After the SDaaS stack is provisioned, the developer only needs to commit the code to the source control repository. The rest of the activities, such as build, tests, and deployment, are automatically executed.

Cisco eStore is built on top of Cisco Prime Service Catalog and Cisco Process Orchestrator. Cisco Prime Service Catalog enables enterprise service management for reporting, chargeback, entitlement, and consistent services taxonomy control. Cisco Process Orchestrator handles automated provisioning of all service requests through integration with other systems.

Focus on Business Outcomes

Expanding the role of business stakeholders in the end-to-end delivery process is a critical part of the continuous delivery model. Frequent dialogue doesn't focus on what IT can deliver but on what business outcomes stakeholders want to achieve. The business is treated as a member of the development team, actively involved alongside IT as capabilities grow from prototype to limited availability to full-blown adoption. Business stakeholders have a high degree of oversight and control over what capabilities are being delivered. Fast feedback loops at regular intervals keep capabilities relevant and connected to current priorities. We can make tweaks in real time as business, market, and end-user requirements change.

Recently, we raised business-IT collaboration to a new level with the launch of our internal User Experience Visualization Service, which enables quick assembly of working simulations for business applications. With this service, iterations between business stakeholders and IT are getting more efficient. We get faster consensus on what we need to build or change without writing a single line of code. Simulations can be done for any user-facing application, whether it's a web, rich Internet, mobile, or thick client application.

Visualization techniques are a vast improvement over textual specifications, static screenshots, wireframes, and UML models that often aren't easily understood by business users and subject to different interpretations. We're already starting to reap the benefits of the User Experience Visualization Service. Chief among them:

- **Lower risk and fewer iterations.** Vague requirements are clarified and missed requirements discovered earlier in the process. Change requests are minimized.
- **Accelerated delivery.** Simulations shrink the requirements cycle time by 40 to 50 percent. End-user expectations are easier to manage.
- **Reduced project costs.** We can iterate faster in a low-cost, low-risk environment. Because of the simulations, our cost and timing estimates are improving.

For the business services in each adoption wave, we're seeing steady progress across IT. Employees are learning and applying Agile and continuous integration practices in the way they collaborate and get work done. They are switching to new tools that automate and simplify product and service delivery. For example, application changes on the Salesforce.com platform are being enabled using a continuous deploy and release orchestration toolset. This shift has radically improved the change deployment process and user experience. Eight complex steps were whittled down to four direct ones, with an 85 percent decrease in user time. Changes that formerly averaged 270 minutes to complete are now done in 40.

For More Information

Cisco study: [Fast IT – Accelerating Innovation in the Internet of Everything Era](#)

To read Cisco IT case studies about a variety of business solutions, visit [Cisco on Cisco: Inside Cisco IT](#).

To view Cisco IT webinars and events about related topics, visit [Cisco on Cisco Webinars & Events](#).

Note

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