Automated Provisioning and Deployment

Enable growth, improve service quality, and free up IT resources for innovation and process improvement

VMWARE WHITE PAPER
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Preface

Today’s IT organizations are under increasing pressure to deploy private or hybrid clouds and become a service provider to their business users. In many cases, this change is motivated by the increasing prevalence of business users going outside of corporate IT to procure IT services direct from external cloud vendors. In other cases, IT organizations view cloud as the answer for enabling greater innovation in the business. Whatever the catalyst, those organizations that have started making the move to cloud have already realized real gains in efficiency, agility, and reliability.

Based on its extensive experience working with customers on their implementations, VMware has identified five capabilities that are essential to unlocking the efficiency, agility, and reliability benefits of cloud:

• **On-demand services**: Service catalog with standardized offerings and tiered SLAs, actively managed and governed throughout its lifecycle, and with end-user access via a self-service portal

• **Automated provisioning and deployment**: Automated provisioning, release, and deployment of infrastructure, platform, and end-user compute services

• **Proactive incident and problem management**: Monitoring and filtering of events, automatic incident resolution, and problem diagnosis

• **Cloud security, compliance, and risk management**: Security, compliance, and risk management policies embedded into standard configurations enabling policy-aware applications and automation of security, audit, and risk management processes

• **IT financial management for cloud**: IT cost transparency and service-level usage-based ‘showbacks’ or ‘chargebacks’ using automated metering and billing tools

This white paper focuses on automated provisioning and deployment.
Executive Summary

Once simply a cost center, IT is now recognized as a key strategic asset for the modern enterprise. More than ever before, CEOs are looking to the IT organization to deliver tangible business value that contributes to the bottom line. As a result, the priorities for today's CIO are quite different than in the past:

• **Innovation:** Refocus IT resources on strategic initiatives that drive business growth and generate new revenue streams

• **Value creation:** Improve front office effectiveness through agile, reliable services that meet the critical needs of the business

• **Differentiation:** Create unique, compelling services that offer competitive advantage and build brand value

Staying ahead of the competition and growing the business require the ability to respond quickly and flexibly to changes in the marketplace. To give them the tools they need to accomplish these objectives, business users are demanding ever-faster service deployment. Gone are the days when they were willing to wait patiently for weeks or months for IT to order, install, configure, and deliver the resources required to host a new business application. Expectations have been ratcheted skyward by delivery models such as Amazon's EC2—you simply swipe a credit card and within minutes can begin building applications on a fully provisioned stack. Users want this kind of responsiveness for their business applications and are more than happy to do their own provisioning—if IT will just give them the right tools.

Automatic provisioning and deployment of customer-requested infrastructure offers a solution. A fully automated system can in principle reduce the infrastructure provisioning time from weeks to days, providing significant benefits to the IT organization as well as business users. However, realizing the full benefits of automated provisioning requires addressing the complete end-to-end workflow, from business request to service activation, which involves technology, people, and processes.
Context

As a context for understanding automated provisioning and deployment of customer-requested services, let’s look at the end-to-end process—from initial business request to service rollout—as a time-to-value proposition. The process can be understood in two segments, request and fulfillment. The request phase is primarily a governance and workflow activity, while fulfillment includes both the technical tasks of provisioning and IT governance.

In many legacy environments, request and fulfillment are both manual processes and therefore relatively inefficient. Fulfillment activities fall almost entirely within the IT group and include tasks such as server (whether physical or virtual) provisioning, configuration, and application standup. Activities in the request phase include processing the user’s request, verifying funding, and securing management approval. These activities add up to a substantial amount of time which is often longer than the fulfillment phase.

Automating the Fulfillment Phase

A common approach is to focus on the fulfillment phase, in other words, streamlining the process from request approval to service rollout. However, the request phase is untouched by such initiatives. Even if substantial reductions are realized in the fulfillment process, there is only limited impact on the total time to value (Figure 1).

The Goal of Automated Provisioning

To realize the full potential of cloud computing in the provisioning and deployment process requires a comprehensive approach that brings significant efficiencies to both request and fulfillment. This approach is the guiding principle behind successful implementations of automated provisioning and deployment of customer-requested infrastructure, platform, and end-user compute services.
The Cloud Capability Model

In working with global enterprises and service providers, VMware has found distinct patterns of IT organizations and their capabilities as they move to embrace cloud computing. VMware has used this insight to establish a Cloud Capability Model, helping IT identify opportunities for growth and evolution of technologies and architectures, organizational models, operational processes, and financial measures. This Cloud Capability Model provides a path for IT to take greater advantage of existing systems, teams, and resources, embrace third-party cloud assets and providers, and extend IT standards for security, governance, and performance into this new model for IT. Across the Cloud Capability Model, customers are able to break free from a situation where resources are exhausted by simply maintaining existing systems to an environment where IT is a clear strategic business partner, delivering new services and capabilities aligned to and in support of business goals.

Automated provisioning and deployment should be understood in the context of the Cloud Capability Model, which provides a roadmap to help organizations assess their current state in regard to people, processes, technology, and business management, and plan cloud initiatives (Figure 2).

![Figure 2. The Cloud Capability Model](image)

**Reactive.** Most IT organizations exhaust significant resources maintaining siloed legacy systems and are therefore challenged to make the desired contribution to future business results. A common response is to standardize the infrastructure, which reduces complexity and reclaims some IT resources for strategic work. The need for rapid innovation has driven business stakeholders outside of traditional IT channels, creating a tension between IT and business stakeholders. As a result, cloud has entered the business opportunistically, threatening to create silos of activities that cannot satisfy the mandates for security, risk management and compliance.

**Proactive.** IT has moved to embrace cloud as a model for achieving the innovation requirements of the business through increased efficiency, agility, and reliability. Shifts in processes and organizational responsibilities attempt to bring structure to cloud decisions and directions. More importantly, IT has embraced a new role, that of a service broker. IT is now able to leverage external providers to deliver rapid innovation within the governance structure of IT, balancing costs, quality of service, and risks. This shifts cloud from being an opportunistic technology purchase to a strategic environment with broader business impact.
Innovative. IT has fully implemented cloud computing as their model for producing and consuming computing, shifting legacy systems to a more flexible infrastructure, investing in automation and policy-based management for greater efficiency and reliability and enabling a broad range of stakeholders to consume IT services via self-service. Detailed measurement capabilities enable IT to quantify the financial impact of sourcing decisions, redirecting saved resources to drive new services and capabilities that advance business goals. IT continues to successfully manage multiple resources from internal and external pools of infrastructure, balancing cost, quality of service, and risk metrics across heterogeneous environments.

As organizations grow their cloud capabilities, the provisioning and deployment process becomes increasingly more automated. Furthermore, the IT group discovers additional services that can benefit from automation. For example, the organization could set an initial goal of reducing the time to provision a new compute instance from 90 to 2 days. Once that goal has been achieved, the IT group can focus on reducing the time even further and using the same approach to achieve similar gains in other services.
Business Impact

IT managers are assuming a more strategic posture within the organization today, requiring them to align their long-range plans to the key objectives of the business. While every organization has a unique set of goals, there are common themes that affect virtually all IT groups today. Organizations that implement an automated provisioning and deployment system can expect to achieve a range of benefits in the areas of efficiency, ability, and reliability.

Efficiency

Request fulfillment resources freed-up for higher-value activities

Automating the provisioning and deployment tasks lessens the time demands on IT staff for routine tasks. In a cloud environment, tasks that previously required senior IT staff to custom build virtual-machine-based development environments—for example, for application developers—can be delegated to more junior administrators.

Such reassignments free up valuable IT time that can be reassigned to higher-value initiatives. The overall impact is that IT transitions from a reactive, tactical mindset to a proactive, strategic posture that drives innovation through activities such as:

• Creating new services and enhancing existing ones
• Monitoring service delivery against agreed-upon service level agreements (SLAs) and taking corrective action proactively—before incidents affect services
• Driving continuous process improvement
• Optimizing processes in preparation for hybrid cloud deployments

Less developer time lost to waiting on environments

In many application and development organizations, developers spend as much as 10 percent of their work day provisioning their own development and test environments, or waiting for those environments to be provisioned for them by the infrastructure operations team. Automated provisioning and deployment of development and test environments, when combined with a developer self-service portal, can recapture some of this time.

Agility

Increased speed-to-market for new business initiatives

Rolling out a new service with a rigid legacy IT infrastructure is a ponderous and inefficient process, requiring substantial investment in equipment and human resources. There is time wasted at every step, both in the request phase and the actual fulfillment process. An automated provisioning system can reclaim most of that time, allowing the organization to roll out a typical business service in a few months—a significant improvement in time to market. Reducing the cycle time lowers the upfront investment, provides fast feedback to enable course corrections, and requires less investment.

Automatic provisioning and deployment is one of the key enablers for a transformation in organizational agility. Faster service rollout provides first-mover advantage, enabling business growth, and building brand value. A more responsive environment allows IT to deliver new and innovative services that help business users execute their tactical plans more confidently and effectively.
Reliability

Reduced downtime due to fewer errors from manual processes
More and more organizations rely on their IT infrastructure as a business-critical—even strategic—resource, a posture that requires extremely high levels of availability. Downtime translates into lost revenues, lower productivity, and damage to the organization’s reputation and brand. A significant number of outages are related to human errors, which are common in complex and ill-defined manual processes. Automated provisioning and deployment enables IT to manage services with fewer errors, leading to higher levels of reliability.

Improved service quality
The benefits of automation extend far beyond the infrastructure. Application developers who can provision their own computing resources via a self-service portal work more efficiently and produce high-quality products and services. QA staff takes advantage of self-service provisioning to quickly bring up test environments without impacting IT operations. Overall, an automated approach to provisioning pays dividends throughout the organization.
Process Design and Implementation

Every company has unique requirements and constraints that must be taken into account when designing a comprehensive, end-to-end solution for automated provisioning and deployment. However, these common principles apply to virtually all automation initiatives.

Step 1: Define and Document Existing Processes

A surprising number of IT processes are poorly defined and documented—in some cases, the provisioning and deployment processes have no formal definitions at all, particularly in the request phase. This approach has significant drawbacks, including inconsistent results, wide variance in labor costs and process duration, unreliable or missing metrics, and poor management visibility. Ill-defined processes are massively inefficient and nearly impossible to optimize. Before the IT group can move ahead with automating the provisioning and deployment process, IT must document the existing processes thoroughly, characterize each process in terms of key metrics, and optimize manual processes as much as possible.

Step 2: Identify Process Owners

Just as many processes lack formal definitions, the same is true for ownership. These challenges go hand in hand: it’s hard to own a process if it lacks an accurate and thorough definition and it’s hard to have an accurate and thorough definition if no one formally owns the process. Identifying owners becomes highly important when the IT group begins to optimize and automate the process of provisioning and deployment. Process owners need to be involved in all phases of process optimization and automation, both to provide valuable insight into the needs of business users and to help in the quality assurance and testing phase of process automation.

Step 3: Optimize Processes Before Automating

When IT managers identify processes that are candidates for automation, their tendency is to plunge right into the technology implementation. However, experience clearly shows that automating an inefficient process has limited value and can even be counterproductive.

Instead, a recommended prerequisite is to optimize the process as much as possible before automating it. Methodologies such as DMAIC (Define, Measure, Analyze, Improve and Control)—the core process used to drive Six Sigma projects and LEAN—offer structured approaches to process improvement. This approach helps IT managers understand the precise location of process delays and create a play to reduce them as much as possible. For example, establishing a line of credit approach as described later in this paper can significantly shorten the management approval time and thus the request phase of the process.

Step 4: Establish Baseline Metrics

Automating the provisioning and deployment process is not a one-time activity, but an ongoing activity that requires continuous evaluation and improvement. To guide their decision making, IT managers should characterize baseline metrics before implementing the automated system.

An important baseline metric is the current end-to-end time from business request to service activation. This measurement forms the reference point to determine the benefit of optimizing the existing process as well as automating the process. Other useful metrics include the number of incidents related to provisioning, system outages as a result of configuration errors, and satisfaction levels of business users. The metrics should be continually measured during and after rolling out the automated provisioning process to measure the actual versus expected benefits and provide hard data for driving further improvements.
Step 5: Develop Policies to Drive Automation

As noted earlier, governance can be the bottleneck that slows down provisioning and limits the benefits of cloud. To combat this challenge, organizations must transition from a manual approval process to policy-based governance workflow.

Standardization plays a large role, starting with the request process. The request form must be easily accessible to all potential users—an intranet portal is often the best approach—and should be streamlined so that users can quickly understand and make their choices, without having to call the help desk.

Once the request is submitted, the rest of the process is driven by pre-established policies. Approval routing is automated based on predetermined levels of required authorization. Service catalog offerings correspond to application stacks that have been configured, tested, and characterized ahead of time—avoiding the need to involve designers in the fulfillment cycle. The infrastructure should have adequate capacity in place to avoid purchasing and installation delays. In short, a policy-based workflow allows routine requests to be quickly approved and fulfilled via an automated workflow. Hands-on IT intervention should be the exception, not the rule.

Step 6: Update Financial Controls

Achieving efficiencies in the request phase of provisioning requires reassessing the financial controls to make sure they support the desired workflow velocity. Requiring full management approval for every expenditure—no matter how small—can be an obstacle to agility and efficiency. As a result, many organizations are experimenting with alternative models of financial governance that provide adequate control without imposing unnecessary constraints on rapid response to changing requirements.

One approach is to give business users a preapproved “line of credit” which they can spend for needed services without explicit approval for individual requests. Other organizations rely on monthly reporting with showback systems to educate business users about the financial impact of their service consumption and establish accountability. Every system of financial controls needs a well-defined process for handling exceptions on a prioritized basis—this is particularly important to support rapid response to unforeseen changes in the marketplace.

Step 7: Create a Separate Pilot Implementation

To avoid impacting existing services, cloud initiatives such as automated provisioning and deployment should be implemented in a pilot environment where IT can thoroughly test and evaluate the architecture and components before moving them into production. A pilot also allows important stakeholders to try out the new system and offer feedback and serves as a training platform for the organization’s early adopters. When the pilot implementation demonstrates the required levels of performance, stability, and usability, IT can begin to transition the automated system into the production environment.
Organizational Considerations

Cloud initiatives require not only the right technology but also organizational changes to people and processes. The most significant changes are to establish two new cross-functional departments, the Cloud Infrastructure Operations Center of Excellence (CoE) and Cloud Tenant Operations.

Cloud Infrastructure Operations Center of Excellence

The CoE coordinates the activities of all the organizational resources that are required to drive a successful cloud initiative. It brings together business analysts and technical experts to consistently measure, account for, and improve the effectiveness of cloud infrastructure operations management (Figure 3).

These functional specialties within the Cloud CoE have particular responsibilities for automated provisioning and deployment.

Analyst
- Develops and updates the cloud infrastructure capacity forecast
- Responsible for the day-to-day capacity and resource management of the cloud infrastructure
- Works with the Tenants Operations team to understand the future cloud service demand forecast
- Initiates requests for new cloud infrastructure components
- Maintains the cloud infrastructure Asset Management data
- Validates billing metering data collected for cloud-based service offerings

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1 A complete description of the functional responsibilities of the members of the Cloud Infrastructure Operations Center of Excellence is contained in “Organizing for Cloud Operations,” 2012, VMware white paper.
**Administrator**
- Works with Cloud Infrastructure Operations COE ecosystem team members to configure cloud infrastructure components
- Creates, configures, and administers cloud provider-related components and cloud-specific operational management tools

**Developers**
- Develops, tests, and deploys cloud-impacting automation workflow
- Evangelizes to and mentors Cloud Infrastructure Operations COE ecosystem teams about cloud integration and automation
- Develops and maintains cloud integration and automation workflow documentation and standards
- Works with Cloud Infrastructure Operations COE member and ecosystem team to establish integration and automation monitoring
- Provides tier 3 cloud integration and automation workflow support

**Cloud Tenant Operations**
Cloud Tenant Operations is central to governing, developing, and providing cloud service offerings. It manages service governance, service design and development, service operations, and provisioning (Figure 4).

![Figure 4. Cloud Tenant Operations](image_url)

These functional specialties within Cloud Tenant Operations have particular responsibilities for automated provisioning and deployment:

**Service portfolio manager**
- Develops and maintains Cloud Service Portfolio policy including the criteria for acceptance and rejection
- Manages the portfolio of cloud services and works with IT management to develop the cloud service offering strategy used to determine what services should be included in the overall portfolio and to make sure the service offering strategy aligns with IT strategy
- Proactively identifies potential cloud service offerings based on demand information gathered from Cloud Consumer Managers or other sources such as requests coming in through the Service Desk
Service catalog manager
• Manages the cloud service offering catalog and makes sure that all of the information contained in the catalog is accurate and up-to-date
• Maintains the Consumer Self-Service Catalog portal information

Service architect
• Defines a cloud service offering based on the requirements provided by the Cloud Service Owner after it’s determined that a particular cloud service offering is to be included in the Cloud Service Portfolio. This involves translating cloud business requirements into technical requirements that can be used to architect a cloud service offering.
• Provides tier 3 cloud service offering support as needed

Service developer
• Works with the Cloud Service Architect to understand cloud service offering technical requirements
• Works with the Application Development team(s) to incorporate bespoke or third party applications into cloud service offerings as needed
• Develops new cloud service offering components into blueprints, or constructs blueprints from existing cloud service offering components, for automatic provisioning
• Releases cloud service offerings into production
• Develops and maintains cloud service offering blueprint documentation
• Works with the Cloud Service Analyst and Application Development to define service monitoring
• Works with Cloud Service Analyst and Application Development to make sure security, operations, and chargeback metering capabilities are built into cloud service offerings
• Develops customizations for and maintains the on-line Consumer Self-Service Catalog capability

Service analyst
• Develops and maintains service capacity forecasts
• Responsible for the day-to-day capacity and resource management of services
• Initiates requests for new or expanded service capacity
• Monitors and analyzes service performance, availability, usage, and other operational analytics

Service administrator
• Administers tools used by Cloud Tenant Operations to govern, develop, and operate services
• Administers customer cloud environments
• Provides tier 3 cloud service offering support
IT Business Management Considerations

Organizations need a mechanism for measuring the business benefits of cloud operations. The IT Transformation Dashboard is a common approach, presenting a set of key performance indicators (KPIs) in an easy-to-understand dashboard format. The dashboard should be distributed on a regular schedule to encourage cloud stakeholders to compare relevant KPIs over time and use these metrics as a common language for interactions within the organization.

Average Time to Provision

This KPI offers a direct measurement of the end-to-end process for provisioning new infrastructure, including both physical and virtual machines. IT managers and business users can employ this metric as an indication of the degree to which IT is supporting the ability needs of the business (Figure 5).

![Figure 5. IT Transformation Dashboard](image)
Technology/Tool Considerations

An important aspect of cloud operations is establishing the right tools and technologies to support the process. This section describes the key tools that provide automation to various aspects of the provisioning and deployment process.

Workflow Engine

As discussed earlier, process optimization and automation is at the center of the transformation of provisioning and deployment. Once the manual processes have been optimized, IT architects can automate the process using a workflow engine. The workflow engine automates the complete end-to-end process, including:

- Initial service request
- Change management submission for deploying a new service
- Application of security, compliance, and risk management policies
- Production release
- Publication in service catalog

The more advanced engines have drag-and-drop interfaces so that designers can easily build workflows using templates and predefined components. The workflow engine should also have prebuilt adapters to integrate with other related IT systems.

Service Catalog

The service catalog is the key to automated provisioning and deployment. The service catalog defines in detail all services—public and private—that are available to business users. It must be kept scrupulously up to date so that users always have a clear picture of the available resources (service surety). The particular implementation of both the public and private clouds needs to be closely aligned with the organization’s goals.

The service catalog of today differs from its counterpart in the 1990s in that the underlying technology details are usually not provided to the users. The rationale is that keeping the implementation details behind the catalog, as it were, provides IT with the maximum flexibility in obtaining resources from either private or public clouds and adjusting that mixture as needed. The business users simply count on IT to deliver to the service-level agreements (SLAs) specified in the catalog—and IT must do so to remain relevant.

Self-Service Portal

The self-service portal is the user’s gateway or store window to services. Users simply browse the online service catalog, where they can drill down to look at the details of each offering and then select and option up the services they want to deploy. Once the appropriate approvals are obtained, the actual provisioning takes place automatically with no “touching” from IT staff. Look and feel and ease of use are critical for successful adoption by users of the portal.

The system for approvals also requires careful consideration. The approval process should deliver value to the consumer while maintaining the necessary financial controls. Too onerous a process can hamper acceptance of the self-service model if the procurement of public cloud services is perceived to be easier than using internal resources through the portal.

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2 This step can also be automated as described in “Policy-based Security, Compliance, and Risk Management,” VMware white paper, August 2012.
3 The service catalog and self-service portal are discussed in more detail in “On-demand Services,” VMware white paper, August 2012.
**Intelligent Analytics**

Many organizations implement intelligent analytics to drive a proactive incident and problem management system. An intelligent analytics system aggregates data from a number of monitoring tools and analyzes that information to identify trends and potential problems. By analyzing data about IT support tickets, intelligent analytics can point out opportunities where process automation can streamline existing processes\(^4\).

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\(^4\) For more information about the use of intelligent analytics in cloud operations, see “Proactive Incident and Problem Management,” VMware white paper, August 2012.
Key Success Factors

Over the course of many successful engagements for automated provisioning and deployment, VMware has identified a number of key organizational factors that can affect the transition to an automated system.

Secure Executive Sponsorship

Senior sponsorship at the executive level is one of the most important predictors of success in implementing an automated provisioning system. The process changes that are required—especially in the governance cycle—often have substantial implications for the organizational structure and job responsibilities. Therefore, alignment between the organization’s IT management and business executives is crucial to drive the necessary buy-in from all stakeholders.

Engage Key Stakeholders in the Planning Process

While executive support ensures a “push” from the top, successful IT teams also actively solicit cooperation from stakeholders directly to “pull” them into the process. Create a detailed roadmap of the proposed transition plan and socialize it with everyone who could be affected. The feedback received at this stage can help avoid major problems in the future and will certainly help to gain acceptance from the user community.

Remember that automation initiatives also impact the IT staff itself—frequently, employees assume that the efficiencies created by an automated provisioning system will either relegate them to mundane tasks or result in layoffs. IT managers must communicate clearly and convincingly with their staffs, outlining in detail the strategic projects to which staffers will be redeployed. In many cases, establishing training plans is a confidence builder, signaling to IT staff that the organization values them—and has bigger plans ahead.

Implement Capacity Management

When organizations deploy an automated provisioning system, business users are quick to leverage this new capability to accomplish their objectives. However, that often leads to a spike in usage, which can strain the organization’s ability to provide the needed resources.

A common response to this challenge is to create a capacity management process to ensure that the infrastructure has enough resources to meet the demands of business users. In this model, a policy engine within the Cloud Infrastructure Operations Center of Excellence is responsible for continuously monitoring capacity and planning for capacity expansion based on historical trends and forward-looking demand. The expansion can rely on internal resources or services from an external provider.

Implement IT Financial Management for Cloud

As described earlier, automated provisioning and deployment impacts the organization’s models for financial governance, part of a broader issue known as IT financial management (ITFM) for cloud. ITFM for cloud describes the financial operating model that maintains the balance between supply and demand for IT resources in a private or hybrid cloud deployment. It specifies the sources of initial and on-going funding for new cloud capacity build-out, defines the approach by which costs are associated with service offerings and apportioned back to the business users, describes the mechanics of cloud IT investments and budget cycles, and elevates the role of IT demand forecasting and capacity planning.

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5 The financial implications of cloud operations are described in more detail in “IT Financial Management for Cloud,” VMware white paper, August 2012.
Next Steps

Once an organization has decided to implement automated provisioning and deployment, there is a set of recommended steps.

Establish Prerequisites

The first step IT leaders need to take before implementing an automated provisioning and deployment system is to evaluate whether the correct prerequisites are in place or in progress. A functioning service catalog is an essential prerequisite, as it provides access to services for business users. Clear objectives for the automated system need to be articulated and communicated to architects and designers. Finally, the required funding must be in place.

Assess Operational Readiness

Many organizations discover too late that they have underestimated—sometimes dramatically—the investment needed in people, processes, and technology to move from their current environment to an automated system for provisioning and deployment. Early readiness assessment is essential to crafting a transition plan that minimizes risk and provides cross-organizational visibility and coordination for the organization’s cloud initiatives. The Cloud Capability Model introduced above provides a high-level map of an organization’s readiness to engage in cloud initiatives.

Many organizations already have a service management framework in place. When key processes have been defined within such a framework, optimizing and transforming them to a cloud operating model is significantly easier.

Prepare the IT Organization for Change

IT leaders should test the waters to see how ready their own organization is for the change to an automated provisioning system. IT managers must communicate clearly to staff the rationale for the change and provide visibility into the impact on individual job responsibilities. It is particularly important that managers discuss any planned reallocation of staff based on reductions in troubleshooting time to alleviate fears of staff reductions.
Why VMware for IT Transformation?

The move to the cloud is a foregone conclusion for many organizations today, but the path forward is often unclear. What is the current state of my infrastructure? How do we begin to move forward? What are the right technology choices for implementing our cloud? Most importantly, who can help us achieve our goals?

VMware has built some of the largest and most successful public and private clouds in the world. Now VMware is using that experience to bring to market a complete solution that includes a full suite of software products as well as the services you need to gain the maximum benefit from cloud computing. This combination of software and expertise, delivered via services and education to customers of all sizes across all industries, is unique to VMware and its global ecosystem of partners.

To learn more about the VMware cloud solution, visit [www.vmware.com/cloud](http://www.vmware.com/cloud)