Top five lessons learned from enterprise hybrid cloud projects

Analysis of successful hybrid cloud projects at more than 140 companies reveals how top performers achieve better results

To help enterprise IT decision makers answer key questions about their cloud computing strategies, the IT Process Institute (ITPI) recently completed a study of 143 organizations that have deployed hybrid cloud solutions. The study examines a wide range of factors that predict better project outcomes. Analysis reveals common use cases, prerequisites, key dependencies, and solution features that are deployed more frequently at IT organizations that achieved better results.

Top performers deploy a hybrid (mixed private and public) cloud solutions to create a more agile cloud service delivery model. They manage diversity, including multiple cloud environments and virtualization platforms. They use a single tool set to manage both provisioning and post-deployment maintenance activities. They actively manage application lifecycle across different environments. And above all, they maintain a keen focus on user needs before, during, and after cloud deployment.

Read this paper to learn key lessons about what's working at top-performing IT organizations, understand potential benefits you can gain from a hybrid cloud solution, and improve your chances of cloud project success.

Top performer highlights:

- More than half of top performers give users access to self-service provisioning across both private and public cloud environments, compared with only 13 percent of low performers who provision to only one environment.

- Starting workloads, such as development and test, in public cloud and bringing them back in house for production, is the single strongest predictor of top performance.

- More than 64 percent of top performers have deployed a solution that can manage multiple virtualization environments, compared with only 20 percent of those with low performance.

- More than 70 percent of top performers had prior experience with application lifecycle management tools or had processes in place to provision development and test environments that closely match production environments, compared with only 40 percent of low performers.

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Based on findings in ITPI research report *Private and Hybrid Cloud IaaS: Secrets of Success.*

IT Process Institute

Why study what works at other organizations?

There is tremendous interest in private or hybrid cloud Infrastructure as a Service (IaaS) solutions. Amazon and other public cloud providers have changed the industry landscape and created demand for self-service access to scalable, resilient, pay-as-you-go computing resources.

Many IT organizations have active projects to deploy agile service delivery models that leverage both private and public cloud service options. A hybrid cloud solution that includes and links both on-premise and off-premise resources can deliver the agility benefits desired by development and business personnel, while also meeting the security, service level, and governance requirements important to datacenter operations.

However, deploying a hybrid cloud requires real change in the datacenter. The change is not just about giving up governance control previously established to optimize world-class service delivery in a static environment. Nor is simply about adding a service catalog to deploy virtual machines on demand in an otherwise manually managed environment.

The study found that there were things common among top performers, that were different than those with less successful hybrid cloud projects.

To deploy a hybrid cloud solution, IT organizations must link and integrate multiple computing environments into a cohesive solution in which boundaries are seamless and transparent to end users. IT organizations must also update standard operating procedures, tools, processes, and controls to manage diverse and dynamic environments with a high degree of automation.

To help IT decision makers achieve success with their own hybrid cloud transformation, the ITPI studied a wide range of successful deployments. The study didn't focus on Software as a Service (SaaS) projects. Instead it focused on learning from enterprises that have successfully deployed their own IaaS hybrid cloud solutions.

Top performers, which represent thirty percent of study participants, were identified based on a combined score of improvements measured by fifteen questions in the areas of developer agility, operational efficiency, service quality, business outcomes, and governance control. A wide range of factors that potentially impact project outcomes, were tested using various statistical techniques, to identify the factors that had the biggest impact on project outcomes, including project prerequisites, critical dependencies, use cases, and solution features deployed.[1]

This paper summarizes the key lessons learned from that research. It highlights a small subset of factors that have a statistically significant impact on project outcomes and that were commonly deployed by top performers. Studying what works at top-performing organizations can help IT decision makers achieve hybrid cloud project success.

Five lessons learned from top performers

1 – Deploy hybrid, not just private

2 – Operational maturity matters

3 - Choose an open cloud strategy

4 - Focus on users before, during, and after

5 – Hybrid cloud benefits are significant

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[1] Data from 143 companies was collected in March 2012. Participants were recruited from all past attendees of CloudCamp events globally http://cloudcamp.org, as well as other sources.

1. Deploy hybrid, not just private

Demand for agile computing models is being driven by public cloud IaaS providers who offer self-service access to on-demand resources with pay-per-use credit card billing. However, many IT organizations have concerns about using externally managed resources for workloads that include customer information, proprietary research and development results, or financial transaction data.

Deploying a private cloud solution maintains control of critical computing assets. However, maintaining responsibility for the entire compute stack from hardware assets up through the operating system, middleware, and application layers may reduce the scale benefits achieved by moving workloads to public cloud multitenant resource pools.

A hybrid cloud approach can deliver the agility and scale benefits desired by development and business personnel, while addressing the governance, security, and service level requirements important to datacenter operations.

Figure 1. Top performers deploy hybrid cloud
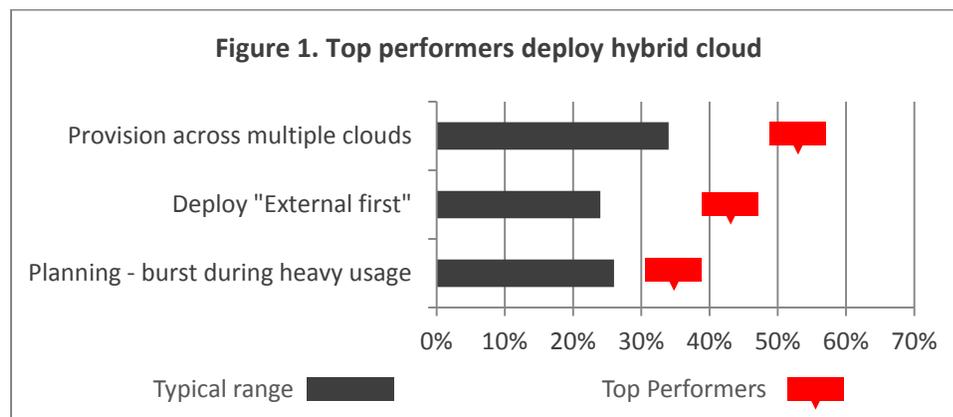
Top performer analysis: Figure 1 shows the range of typical IT organizations that have deployed various private, public, and hybrid use cases, compared to the average percentage of top-performers. Three factors strongly predict better hybrid cloud project outcomes:
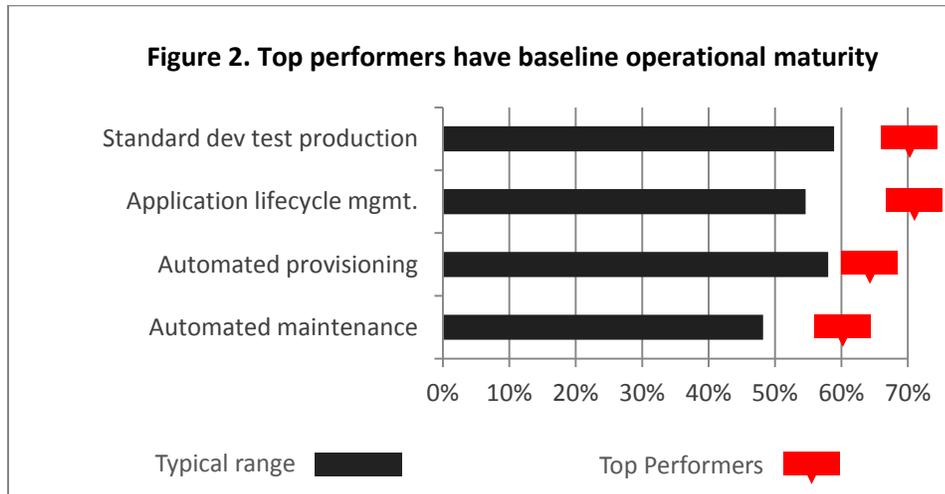
- Fifty-two percent of top performers have automated provisioning across multiple cloud environments, compared with only 13 percent of low performers who primarily provision to one environment.

- More than 43 percent deploy new workloads in external cloud environments first, before moving back in-house for production. Development, test, and prototypes are examples of workloads that typically fall into this *external-first* category. In contrast, only 14 percent of low performers use this approach. The external-first use case is the strongest predictor of top performance out of all use cases tested.

- Planned and unplanned burst, where external resources are tapped during periods of heavy demand, is not currently widely deployed. However, more than 35 percent of top performers are in the planning stages for bursting, compared with less than 15 percent of low performers.

Top performers are pursuing hybrid cloud strategies.

Lesson learned: Top performers are pursuing hybrid cloud strategies. Hybrid cloud solutions allow developers to deploy new capabilities more quickly, at lower cost, and with more accommodating deployment processes while IT stays in control of critical computing assets. Although tapping external resources during periods of heavy usage was an early vision for hybrid deployments, top performers have instead focused initial efforts on an external first approach. Clearly, a mixed model with interoperability between environments requires a solution that is capable of managing technology and operational complexity.

2 - Operational maturity matters

IT organizations must update standard operating procedures, tools, processes, and controls to support a more agile service delivery model. However, self-service provisioning, resource scaling, and shifting workloads within and among cloud resource pools are only effective if managed in a highly automated fashion. Automating datacenter management activities typically requires a higher level of standardization and operational maturity.

Figure 2. Top performers have baseline operational maturity

Standard dev test production	
Application lifecycle mgmt.	
Automated provisioning	
Automated maintenance	

0% 10% 20% 30% 40% 50% 60% 70%

Typical range ▬▬▬   Top Performers ▼

Top performer analysis: As Figure 2 shows, analysis of a wide range of cloud project prerequisites reveals several factors that suggest top performers have a high level of operating maturity prior to starting cloud projects.

- Almost 70 percent of top performers had experience standardizing configuration across development, test, and production environments prior to cloud deployment, compared with only 37 percent of low performers.

- More than 71 percent had deployed Application Lifecycle Management (ALM) tools, compared with only 43 percent of low performers.

- Sixty-four percent had experience with automated provisioning of virtual machine images, compared with only 43 percent of low performers.

- Sixty-four percent had experience automating production system maintenance activities, compared with only 30 percent of low performers.

Lesson learned: Top performers standardize their computing environments and operating procedures before starting hybrid cloud projects. Standardization is more important in a dynamic environment than in a traditional, static datacenter environment. Quick deployment of new prototype applications or features followed by scaling in a production environment requires a high degree of standardization. Managing the application lifecycle, including moving workloads from a public cloud to private cloud, or back in cases of heavy usage, is complex. Experience helps build skills and facilitates development of exception-handling approaches prior to the adoption of a highly automated operating model.

Although experience does predict better project outcomes, organizations that don't have higher levels of operational maturity shouldn't avoid hybrid cloud deployment. They should simply keep in mind that they need to focus project resources on standardizing environments and processes and enforcing the use of those processes to minimize exceptions that might reduce the effectiveness of automation. Don't assume that operational maturity will be a priority for the teams responsible for tool deployment. Apply extra resources to identify and remove points of friction to make the hybrid cloud meet long-term requirements for service quality and supportability.

Top performers standardize computing environments and operating procedures before they start their hybrid cloud projects.

4

3 - Choose an open cloud strategy

Most organizations don't have the luxury of developing a cloud strategy without considering constraints imposed by existing solutions. A silo strategy involves a single-purpose cloud environment, such as for development and test activities only. Or, one that is limited to a specific technology stack. An open strategy accommodates a wider range of technologies and may also encompass the full application lifecycle from development to production release, and beyond to ongoing maintenance in production.

In general, an open cloud strategy offers more flexibility in both the short and long term. A purpose built cloud using an open platform can be run as a silo, but with options to extend use at some point in the future.

Figure 3. Top performers manage diversity
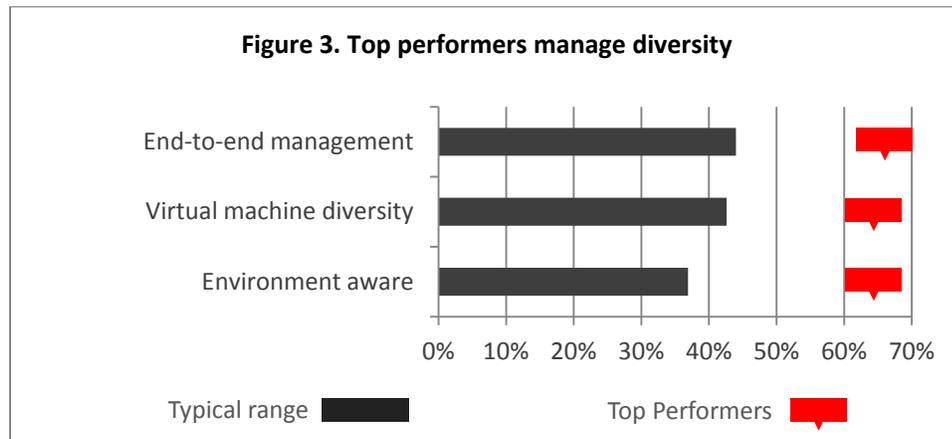
Top performer analysis: As Figure 3 shows, analysis of a wide range of hybrid cloud solution capabilities identifies three factors that strongly predict top performance.

- More than 66 percent of top performers have deployed a solution that includes end-to-end management of performance and availability of service components, compared with less than 24 percent of low performers.

- More than 64 percent of top performers have deployed a solution that can manage multiple virtualization platforms, compared with only 20 percent of lower performers.

- More than 64 percent of top performers have solutions that are *environment aware* and modify deployment to fit the needs of target environment, compared with less than 20 percent of low performers.

Lesson learned: Top performers deploy open hybrid cloud solutions that can manage the diversity found in typical datacenter. The enterprise open cloud strategy is the most common approach for top performers in this study.[2] Hybrid cloud deployments should be designed to manage a diverse set of workload types, technologies, and virtualization platforms, as well as manage automation and orchestration of both pre- and post-provisioning activities.

Datacenters are messy. They typically have a wide range of technologies, operating systems, and programming languages, and, increasingly, they have multiple hypervisor technologies. To achieve the greatest return on investment for a hybrid cloud effort, the solution should fit the broadest possible set of workloads. However, most existing applications were developed in the precloud era, where infrastructure was custom designed to meet the unique needs of each application. Hybrid cloud deployments can help create a bridge from a past state of highly customized infrastructure to a future state of highly standardized infrastructure.
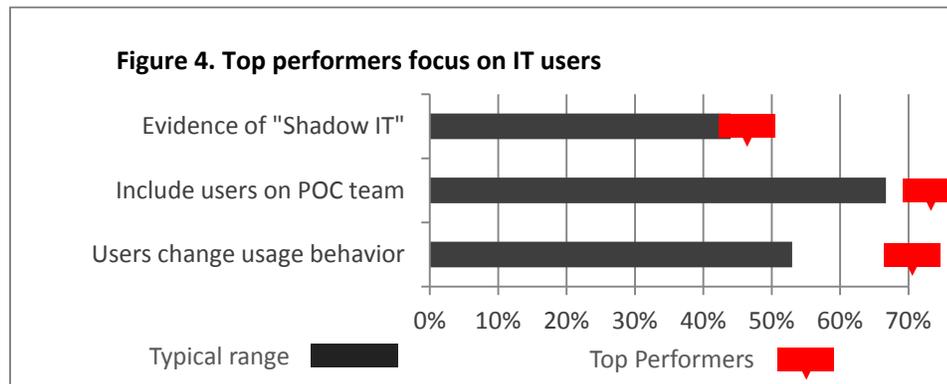
> Top performers deploy open cloud solutions that can manage the diversity found in the typical datacenter.

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[2] When asked "Pick the statement best matches your general cloud strategy and goals." the "Enterprise Open" was most commonly selected with 41 % of organizations pursuing that strategy.

4 - Focus on users before, during, and after

One of the biggest risks with building and deploying a hybrid cloud solution is that it won't meet user needs. After all the hard work and sunk cost that goes into a cloud deployment, users might still work around IT, ignoring mandates for central governance controls.

Eager to deploy cloud solutions, many IT organizations start thinking in terms of architecture options or adding a service catalog to enable self-service deployment of virtual machines. Often the logic is, "If users are going around IT to get compute resources from a public cloud vendor, let's match the public cloud vendor offering so we can maintain control."

This is a logical reaction to the pressure of external competition. Unfortunately, it ignores all the hard lessons learned that have resulted in a user-centric service design approach. After all, users may view public cloud resources as the best available option, but may still be unsatisfied and feel the public cloud falls short with respect to meeting their needs.

Figure 4. Top performers focus on IT users

Evidence of "Shadow IT"
Include users on POC team
Users change usage behavior

0% 10% 20% 30% 40% 50% 60% 70%

Typical range

Top Performers

Top performer analysis: As Figure 4 illustrates, focus on user needs before, during, and after deployment strongly predicts top levels of project success.

- Before - 47 percent of top performers detected evidence of *shadow IT* where users were procuring third-party cloud services outside IT governance control, compared with only 31 percent of low performers.

- During - 76 percent of top performers involved users in the proof-of-concept project teams, compared with only 36 percent of low performers.

- After - 71 percent of top performers took steps to train users after cloud deployment to shape behavior to consume IT as a service, compared with only 42 percent of low performers.

> **Top performers are intensely focused on identifying and meeting user needs before, during, and after hybrid cloud deployment.**

Lesson learned: Top performers are intensely focused on identifying and meeting user needs before, during, and after hybrid cloud deployment. Often, technology-focused IT organizations lack the skills or personnel responsible for designing, deploying, and managing services that best meet user needs. And yet that is exactly what is required to ensure cloud project success. Unlike a virtualization project, which can be managed as an internal IT effort, cloud projects succeed when they offer agile services that drive business success. As a result, an external-user-focused orientation is required.

Designing and deploying cloud services with a keen focus on business users is critical for changing user behavior and driving adoption. Keep in mind, the initial hybrid cloud deployment is just the first step. A user-centric service delivery model will likely result in ongoing adjustments and modifications of the service portfolio to meet evolving business needs. Staff and actively manage service evolution to achieve ongoing success.

5 – Benefits are significant

Data from this study suggests that benefits *are* frequently achieved with hybrid IaaS cloud solutions. For top performers especially, these benefits can be significant.

The survey included a series of open-ended questions about hard-measure improvements to gauge results in the areas of application deployment time, operational efficiency, and service quality. Figure 5 summarizes the benefits achieved by study participants.

Resource deployment time	
Mean time to deploy (MTTD) server or test/dev environment	Order of magnitude improvement: Months to weeks, weeks to days, and days to minutes were frequently cited
Effort per deployment	Significant savings often cited in terms of multiple hours per deployment
Operational efficiency	
Server to sysadmin ratio	Average improvement was 230 percent - from 19 to 63 servers managed per systems administrator
Server utilization rate	Average improvement was 45 percent - from 40 percent to 58 percent
Service quality	
System uptime	Average improvement was 20 percent
Mean time to repair (MTTR)	Average improvement was 25 percent

Figure 5. Summary of benefits achieved through hybrid cloud projects.

Top performer analysis: The acceleration of deployment time is frequently an order of magnitude improvement or more. Reducing capacity planning requirements and eliminating the need to plan infrastructure procurement significantly reduces effort and time required to deploy computing resources. Removing deployment overhead work and giving users self-service, on-demand access can significantly streamline deployment efforts.

> The acceleration of deployment time is frequently an order of magnitude improvement or more.

Operational efficiency also improves significantly in a cloud environment. Standardization and automation help streamline management tasks and can significantly increase the number of servers managed by each administrator. As personnel costs often dominate total cost of ownership (TCO) calculations, improved operational efficiency can have a significant impact on the cost advantage of a cloud deployment. Server utilization rate improvements also help drive down TCO by reducing the amount of infrastructure required to support a diverse IT service portfolio.

Service quality, too, improves in a cloud environment. There is a high degree of variability in how IT organizations measure service quality. For example, some measure uptime in terms of *n* nines (for example, 99.99 percent). Others measure in terms of unplanned downtime per month. When asked to describe changes to uptime, the average response was 20 percent.

Lesson learned: The benefits of hybrid cloud deployments can be significant. IT decision makers can reasonably expect to achieve results similar to those commonly attained by study participants.

Conclusion

A study of the various factors that predict better project outcomes at top-performing IT organizations reveals common use cases, prerequisites, key dependencies, and solution features that are deployed more frequently by those who achieved better results.

In particular, top performers:

- Mix private and public cloud solutions to create a hybrid environment that promotes more agile cloud service delivery
- Manage diversity, including multiple cloud environments and virtualization platforms
- Use a single tool set to manage both provisioning and post-deployment maintenance activities
- Actively manage application lifecycle across different environments
- Concentrate on user needs before, during, and after cloud deployment.

Many organizations participating in the study reported substantial benefits from their private and hybrid cloud deployments. IT decision makers who consider the lessons learned from top performers can reasonably expect to realize similar benefits.

Red Hat Cloud Solution Overview

Red Hat® delivers the world's leading open hybrid cloud solutions for private clouds, hybrid clouds, and public clouds. Red Hat solutions combine a full portfolio of products—including Red Hat® Enterprise Linux®, Red Hat Enterprise Virtualization, Red Hat Storage, JBoss® Enterprise Middleware, Red Hat CloudForms, and Red Hat OpenShift PaaS—to give your enterprise an easy on-ramp to open hybrid cloud computing with a lot less complexity.

OpenShift Enterprise PaaS Solution - brings the scalability and elasticity of the cloud to the world of the developer. PaaS automates and standardizes developer workflows which allows the IT application development process to accelerate and better serve the needs of the business. Red Hat OpenShift enterprise PaaS can provide the developer benefits of PaaS in an open hybrid cloud fashion that can be controlled and managed by IT Operations subject to the governance requirements of the enterprise.

Red Hat Hybrid IaaS Solution - allows you to take back control of your organization's IT resources and increase the productivity of your IT personnel while responding faster to user requests. Included is a self-service portal that allows users to deploy needed applications according to their schedules while freeing you to work on other high-value-added tasks. The portal is policy- based allowing IT to control who uses what, when, where, and how.

Red Hat Cloud with Virtualization Bundle -solves the problems faced by organizations who wish to virtualize, but are facing problems that virtualization alone does not address. The Red Hat Cloud and Virtualization Bundle solution allows organizations to realize the benefits of cloud for the cost of virtualization while providing a more unified end user experience.

For more information, visit http://www.redhat.com/solutions/cloud-computing/