

March 20, 2009 | Updated: April 13, 2009

# Best Practices: Aligning Your Infrastructure And Operations Department Around Virtualization

by Galen Schreck and Rachel A. Dines  
for IT Infrastructure & Operations Professionals

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by **Galen Schreck and Rachel A. Dines**  
with Simon Yates and Alex Crumb

## EXECUTIVE SUMMARY

Getting the most out of virtualization requires firms to overcome cultural divides that exist within even the most functional of IT departments. Persuading the business to make the upfront investment in virtualization is no small task, but even companies that have accomplished this often have trouble persuading application owners to go virtual. And even companies that have successfully done all of this *and* implemented a virtual environment don't see the cost savings and efficiency gains they were expecting. Why? Because virtualization requires new skills, new processes, and new alignments within your infrastructure and operations (I&O) department. This report outlines the best practices that you should follow to optimize your I&O department for maximum efficiency gains with virtualization.

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## NOTES & RESOURCES

Forrester interviewed 11 vendor and user companies, including Graybar Electric, HCL Infrastructure Services Division, I-Business Network, IKON Office Solutions, the state of Indiana, Swizznet, a US Air Force base, Whitney National Bank, YMCA of Metropolitan Milwaukee, a large financial services institution, and a public financial institution.

### Related Research Documents

["Why Isn't Server Virtualization Saving Us More?"](#)  
January 28, 2009

["Role Overview: Capacity Manager"](#)  
December 1, 2008

["Improving The Perception Of IT Requires A Focus On Business Trust, Not Just Technology"](#)  
August 15, 2008

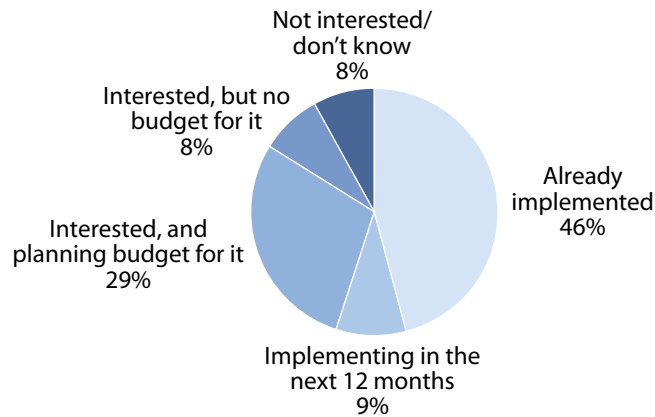
["Forrester TechRadar™: Infrastructure Virtualization, Q2 2008"](#)  
April 4, 2008

### DESPITE WIDE ADOPTION, ENTERPRISES STILL STRUGGLE WITH VIRTUALIZATION

According to a recent Forrester survey, x86 server virtualization adoption reached 46% among enterprises in 2008, with another 9% in the implementation phase (see Figure 1). Despite broad adoption, most firms still struggle with technical and organizational changes that virtualization brings. Major challenges include getting business and executive buy-in, motivating application owners to move to virtual machines, and restructuring your team to achieve maximum efficiency in a virtualized environment.

**Figure 1** Server Virtualization Has Wide Adoption And Interest Among Enterprises

**“What is your company’s highest level of awareness or interest in x86 server virtualization?”**



Base: 118 x86 decision-makers at North American and European enterprises

Source: Enterprise And SMB Hardware Survey, North America And Europe, Q3 2008

47320

Source: Forrester Research, Inc.

### ALIGNING I&O AROUND VIRTUALIZATION: BEST DEMONSTRATED PRACTICES

To find out how successful organizations align their infrastructure and operations departments around virtualization to reap the maximum efficiencies and savings, we interviewed I&O professionals and experts on virtualization at nearly a dozen organizations. From our interviews, we learned of the challenges and triumphs that many organizations face when aligning their departments around virtualization. From these conversations, we determined the following best practices (see Figure 2):

1. Get the business on your side and prove that virtualization works.
2. Give your staff the additional skills they need to be successful with virtualization.
3. Reap the maximum benefits of virtualization by making your team more efficient.

**Figure 2** Aligning I&O Around Virtualization Best And Next Practices

Best practice	“How to”	Pitfalls
Get the business on your side.	<ul style="list-style-type: none"> <li>• Prove to them that it works.</li> <li>• Bring in a consultancy to assist with financial analysis.</li> <li>• Use chargeback or memoback as an incentive to go virtual.</li> <li>• Offer better system availability as a reason to go virtual.</li> </ul>	<ul style="list-style-type: none"> <li>• Overestimating the risk, underestimating the capabilities</li> <li>• Failure to enlist executive support</li> </ul>
Give your staff the tools they need to be successful.	<ul style="list-style-type: none"> <li>• Employ a combination of vendor and peer-to-peer training.</li> <li>• Train your staff on the other skills they will need when running a virtual environment.</li> <li>• Let the virtualization subject matter experts (SME) emerge naturally.</li> <li>• Bring in a contractor if it's beyond the skills of your internal staff.</li> <li>• Consider those with relevant experience over certified professionals.</li> </ul>	<ul style="list-style-type: none"> <li>• Dividing up your server admin group into virtual and a physical teams right away</li> <li>• Failing to implement a “virtual first” policy</li> </ul>
Improve agility by maximizing productivity.	<ul style="list-style-type: none"> <li>• Grow your environment without increasing your staff.</li> <li>• Optimize your IT management processes for a virtual environment.</li> <li>• Use virtualization as a driver toward more centralized IT services.</li> <li>• Standardize on a hardware configuration or at least a single vendor.</li> </ul>	<ul style="list-style-type: none"> <li>• Server sprawl</li> <li>• Assuming near-term labor savings means you can streamline your staff</li> </ul>
Next practices	<ul style="list-style-type: none"> <li>• Evolve virtualization into just another tool in the toolbox.</li> <li>• Consider virtual networks and storage in addition to servers.</li> <li>• Think beyond virtualization for cost savings only.</li> <li>• Unify a siloed IT department.</li> <li>• Take advantage of the economic times and resubmit your proposal.</li> </ul>	

47320

Source: Forrester Research, Inc.

## BEST PRACTICE NO. 1: GET THE BUSINESS ON YOUR SIDE

Although this may seem like an obvious step, it's not an easy one. Many firms struggle to convince application owners that their applications will run at the same level (or faster) on virtual machines as they did on physical machines. Many organizations' virtualization implementation is a bottom-up — or “grassroots,” as one company described it — initiative. Here are some of the ways that infrastructure and operations departments we interviewed were able to successfully persuade the business to go virtual:

- **Prove to them that it works.** Application owners are most concerned about performance and availability. Start small with a trial of the development or test environment on one of their non-critical apps. Before you begin, set up achievable service-level agreements (SLAs) and then prove that the virtual machines can reliably meet or outperform them.

“We were fortunate and started small and grew slowly for quite a while. Once we felt like we were where we needed to be from an experience level, then we started accelerating, and that is why we were successful. If you jump in without a lot of knowledge, you'd better hire someone who knows what they are doing.” (Ted Hoffman, director, enterprise architecture and operations, Graybar)

Whitney Bank took this a step further by using metrics, reporting, and tracking for all systems, so when there is a performance issue, they can easily pinpoint the true cause and demonstrate that the virtualization platform is operating correctly. Having transparency into performance metrics is a good tactic for gaining the trust of the business.<sup>1</sup>

- **Bring in a consultancy to assist with financial analysis.** As Ted Hoffman of Graybar said, if you don't know what you're doing, you'd better bring in someone who does. Bring in a consultancy to build or vet your business case and ROI before you present it to the business. You will improve your chances of getting approval with the credibility of third-party methodologies backing you up.<sup>2</sup> It helps to have a second opinion, as you may overlook cost savings beyond the server hardware, such as improved disaster recovery, reduced numbers of Ethernet and Fibre Channel ports, faster provisioning, or better availability for the majority of applications. Plus, you'll appreciate using a validated methodology when defending harder to quantify cost savings like improved disaster recovery capabilities.
- **Use chargeback or memoback as an incentive to go virtual.** Chargeback can be an extremely powerful tool for persuading application owners to migrate to virtual machines. The Indiana Office of Technology leverages this very successfully by charging a single price for a managed virtual server that is 10% less than its fee to manage a separately purchased physical machine. In other words, customers save 10% plus the cost of a physical server. If you don't have a chargeback process already set up, consider memoback, where managers receive notifications on what they're consuming, either in dollar amounts or in lists of resources. They're not charged for their usage, but seeing usage trends can help influence behavior in a positive manner.

- **Offer better system availability as a reason to go virtual.** There are plenty of good clustering, replication, and disaster recovery products out there. The trouble is they cost too much. You can afford to protect your most mission-critical apps, but what can you offer the other 70% or 80%? Tape backup with a two-day return to operations SLA? Virtualization offers a range of availability and disaster recovery capabilities that can provide quick restoration or the ability to failover to an alternate site. Pitching the better availability to the business as a perk of virtualization will help your case. Whitney Bank was able to improve its emergency server recovery time from a two-day SLA to a 2-hour SLA but says it can usually recover the server in 30 minutes.

### Pitfalls To Avoid When Getting The Business On Your Side

Getting the business on your side can be a tricky task, even if you do a great job presenting all of the benefits and get business case support from an external consultant. The most frequent pitfalls are:

- **Overestimating the risk, underestimating the capabilities.** Unfortunately, it's very common for the business to overestimate the risk of server virtualization. One of the large financial institutions we spoke with had successfully virtualized its testing and development environments but couldn't get sponsorship for a rollout to production due to risk aversion. In the case of Whitney Bank, it took a major declared disaster to prove to the executive team that the rewards of virtualization far outweigh the risks.
- **Failure to enlist executive support.** Many virtualization implementations are initiated by IT and gain internal support from the bottom up. But no matter how great your pilot environment is, your efforts may come up short if your CIO or executive management doesn't provide some additional motivation. How? Executives at companies with successful virtualization initiatives set and enforce IT standards that govern which types of apps will be virtualized, and they may require app owners to obtain a waiver to deviate from the recommended solution.

### BEST PRACTICE NO. 2: GIVE YOUR STAFF THE TOOLS THEY NEED TO BE SUCCESSFUL

With new technologies come new required skill sets. How will you train your staff on these new technologies? What are the new skills required? Some firms hire a new staff member as the resident virtualization expert or hire a consultancy to drive the process. However, we found that of all the organizations we spoke to, only the Indiana Office of Technology hired a full-time virtualization expert to join its staff. A few firms we interviewed brought in contractors or consultants to help with the migration from physical to virtual servers, but most completed the project only with their own internal staff. Forrester's best practices for giving your staff the tools they need are:

- **Employ a combination of vendor and peer-to-peer training.** Many firms that we spoke with used a combination of vendor and peer-to-peer on-the-job-training to bring all of their staff up to speed on virtualization. To minimize costs, a large US Air Force base sent only a few key

members of the team to training with the vendor. Those who had been trained by the vendor returned and trained their peers on the job. Most vendors will offer combinations of on-site or Web-based training, but most organizations we spoke to found that peer-to-peer training was the most successful.

- **Train your staff on the other skills they will need when running a virtual environment.** Most of the companies that we interviewed said that load-balancing and capacity management skills are a new and important part of running virtual infrastructure. Since virtual resources are shared among multiple apps, it's important to ensure that resources are never overcommitted and that SLAs are established and met. If you're running a large enough virtual environment, you may want to consider hiring a capacity manager or assigning the duty of capacity management to one of your existing FTEs who shows potential for the role. The kind of skills you should look for in a capacity manager are strong communication skills, planning and negotiation skills, modeling and forecasting skills, and standards and policy knowledge.<sup>3</sup>

“Capacity management is a day-to-day task that is growing rapidly. . . . As we build out and move toward [greater levels] of server utilization, our employees will need different skill sets to move workloads around dynamically. On the one hand, you need sophisticated forecasting skills for how much hardware you are ordering, but you also want to be able to deal with market spikes that weren't predicted. Out of this, a forecasting skill set will develop.” (technology manager, large financial services institution)

- **Let the virtualization subject matter experts (SME) emerge naturally.** All of the organizations we interviewed that hadn't brought in an external virtualization expert agreed that letting your virtualization SMEs emerge naturally was the best approach.

“We don't separate our staff. Everyone is responsible for everything. . . . We trained all the server administrators on virtual environments and expect them all to be able to do the same work. We treat the [physical and virtual] environments the same, which has helped with the support. We have had some people that have excelled on virtual environments, and they have evolved into the SMEs.” (Scott Erlichman, senior vice president, Whitney Bank)

- **Bring in a contractor if it's beyond the skills of your internal staff.** For a particularly difficult migration, it may be in your best interest to bring in a contractor or consultant for the specific project. For example, for the tricky task of virtualizing its email server, the Indiana Office of Technology brought in a contractor to do the work, shadowed by the internal team so they could learn how to migrate and tune the performance of demanding applications like Microsoft Exchange. Others, like I-Business Network, felt that they could not afford the time it would take to bring consultants up to speed on their environment, so they designed their virtual environments in-house, but had experts at Citrix and Dell examine the work to make sure they would get the performance and availability they expected.

- **Consider hiring those with relevant experience over certified professionals.** Not everyone needs a VMware Certified Professional or Citrix Certified Administrator to be successful. In fact, more and more I&O leaders are discounting certifications in lieu of relevant experience. This is because many I&O leaders have found that a good virtual infrastructure administrator needs broad experience with server, storage, and networking technologies — as well as experience with forecasting and capacity planning. Many of these competencies can only be acquired with years of hands-on experience.

### Pitfalls To Avoid When Giving Your Staff The Tools They Need To Be Successful

Giving your staff the tools they need to ensure virtualization success can be tricky. As you go about implementing the above best practices, be sure to avoid the following pitfalls:

- **Dividing up your server admin group into virtual and physical teams right away.** Resist the temptation to train only half your staff on virtual environments and have a dedicated virtual environment group and physical environment group. Most of the organizations we spoke with felt that they were more efficient with one unified group and that separate groups impeded the communication and cooperation that is vital between the two teams. Several of the organizations we spoke with were taking this one step further and collapsing their server and storage administrators into one group.

“We are driving more toward blended, efficient teams, i.e., less silos. While I have certain resources that tend to focus more in the Wintel space, others on AIX and storage, I am actively bringing those teams together under the same director. . . . The fewer divisions you have the better, but as with everything there needs to be a balance; you can take that concept too far and create a lack of focus and confusion.” (David Levine, vice president, technology infrastructure and end user services, IKON Office Solutions)

Longer term, Forrester believes a new class of administrator, the virtual infrastructure admin, will take on the operations of the physical infrastructure and virtualization platform across server, storage, network, and possibly desktop domains. This specialization will allow other admins to focus on running the operating systems and applications within the VMs without having to worry about the rest of the infrastructure. Today, however, management tools don't provide the required virtual and physical visibility.

Virtual infrastructure admins need to know if their VMs are all in good health, and if there are any potential issues with the physical or virtual infrastructure. But virtualization platforms don't provide much information about the outside physical world. For example, should virtual infrastructure admins have to use OpenView or Cisco tools to look at the physical network infrastructure? No — they don't need that much information or control, and those tools are designed for the network engineer. Meanwhile, the network engineer doesn't know anything

about the configuration of virtual servers and isn't in the business of looking for problems in the virtual infrastructure. While tools will eventually catch up, our interviewees have already figured out the answer for today: collaborate.

- **Failing to implement a “virtual first” policy.** When a request for a new server comes through the workflow, it's imperative that a virtual server always be considered first. Almost all of the organizations we spoke with had this policy, which prevents the procurement of unnecessary resources that will negate the cost-saving benefits of virtualization. Physical machines are only considered when an application cannot be virtualized for performance or vendor support reasons. A large US Air Force base encountered this problem when certain application owners refused to go virtual and were allowed to purchase physical servers, leading to inefficiencies and setting a precedent for future virtualization dissenters.

### BEST PRACTICE NO. 3: IMPROVE AGILITY BY MAXIMIZING PRODUCTIVITY

Most firms have no trouble realizing the hard dollar savings associated with virtualization (i.e., deferring capital expenditure on hardware and equipment), but soft dollar savings are harder to quantify and thus harder to achieve. There are several ways in which you can use virtualization to make your team more productive, thus increasing operational efficiency:

- **Grow your environment without increasing your staff.** It's a generally accepted fact that virtual machines take fewer man-hours to manage than physical servers. When discussions of streamlined management arise, system administrators tend to fear for their jobs. However, this fear is unfounded. None of the firms that Forrester interviewed decreased their staff due to virtualization, even though all of them reported major productivity gains. Examples of this include Whitney Bank, which was able to grow its environment by 25% without increasing staff, and Graybar, which increased its admin-to-server ratio from 1:35 to 1:89. Logically, this makes sense. When you're able to turn off a box because its workloads have been consolidated or virtualized, do you throw away that box? No. Instead, you will most likely use that box to expand your environment.
- **Optimize your IT management processes for a virtual environment.** Server provisioning and the server request workflow promise huge efficiency gains, but only if you re-architect the process around virtualization. If your server request workflow involves filling out and emailing a spreadsheet, you're not taking advantage of the templates included in the virtualization software. Set up a self-service portal where end users can select a VM from a list of set templates, which is automatically provisioned or sent for approval to the next person in the workflow. This can reduce provisioning time from several days (or weeks) to a few hours, without even including procurement time. You will also need to rethink processes such as backups, software distribution, and virus scanning if you want to reap the full benefits of an efficient virtual environment.<sup>4</sup>

- **Use virtualization as a driver toward more centralized IT services.** Virtualization can be a very effective way to unify a decentralized IT department. Because virtualization requires a centralized environment to reach the economies of scale required for maximum cost savings, organizations can leverage this to drive toward more centralized IT services. Start with a shared test/development environment to show the cost savings that can be achieved when the disparate IT departments combine resources instead of implementing virtualization in many smaller environments.
- **Standardize on a hardware configuration or at least a single vendor.** Many of the firms we interviewed have standardized on two to four hardware configurations for all physical servers to keep the procurement process simple and to allow for reallocation and reuse of the hardware. Standardizing on a single vendor will also save time and money, as your staff will only have one vendor to coordinate with for purchasing, maintenance, and support. The Indiana Office of Technology, for example, saw huge cost savings when it had its hardware vendors bid against each other for a “winner take all” deal. Because virtual servers are very portable across hardware platforms, the problems (i.e., lock-in) associated with a single vendor are greatly reduced. If a server vendor failed to meet performance standards, it’s simple to replace them.

### Pitfalls To Avoid When Trying To Maximize Your Team’s Productivity

When putting new processes in place to make life easier for your staff and the end user, there is one major pitfall you need to look out for:

- **Server sprawl.** When you make it too easy to request and provision a server, end users will begin to request new servers rather than run multiple apps on one machine or take turns with test systems, and the result is server sprawl. Many of the organizations we interviewed agreed that they had seen an uptick in the number of server requests, especially from application development teams that go through environments like candy. Scott Erlichman of Whitney Bank explains how the problem of server sprawl arose and how they addressed it:

“Server provisioning is so easy that you need to put in process controls for server sprawl — it is too easy to spin up a new environment. We are implementing a change management model under ITIL and implementing the same change management on distributed systems. We have metrics that we run once a month that show server counts, how many physical and virtual servers a department has. Then we can look at trends and dig in.” (Scott Erlichman, senior vice president, Whitney Bank)

- **Assuming near-term labor savings means you can streamline your staff.** As mentioned earlier, none of the interviewed companies downsized their operations staff as a result of virtualization. Instead, they reallocated staff, grew their environments, and worked on transforming themselves from a reactive department that puts out fires to a proactive or strategic department that anticipates the needs and requirements of the business ahead of time.

## FORRESTER'S ALIGNING I&O AROUND VIRTUALIZATION NEXT PRACTICES

While our research uncovered a number of best practices for aligning your infrastructure and operations department around virtualization, here are some next practices that you should focus on once you've mastered the basics:

- **Evolve virtualization into just another tool in the toolbox.** Approach virtualization as an ongoing process rather than a one-time project. Once application owners are more comfortable with the idea of virtualization, it can become just another tool in the toolbox, to be used whenever it's needed without concern for political battles and cultural rifts. The key to this is in treating virtualization the same as any other technology. Graybar has an excellent approach to virtualization, which is to go beyond the hype and evolve it into everyday processes:

“[Virtualization is] not a panacea, it's not the Holy Grail. You have to treat it like anything else; it is a good tool and it has to be managed correctly. . . . We continually look for things that can be virtualized. Virtualization is not a project, it's just part of the DNA. We treat it as another tool in the toolbox; we are constantly looking at the infrastructure and making it more efficient. It's just another device that we use to make us more efficient.” (Ted Hoffman, director, enterprise architecture and operations, Graybar)

- **Consider virtual networks and storage in addition to servers.** Surprisingly, very few of the organizations that we spoke with used virtual storage or networks beyond virtual LANs (VLANs). Storage virtualization makes your virtual environment easier to manage, utilize, and protect by providing a common management layer across all resources.<sup>5</sup> Network virtualization can include virtualizing your network hardware, bandwidth, performance, or security, and leads to performance improvements and better security. And both storage and network virtualization provide great cost avoidance opportunities.
- **Think beyond virtualization for cost savings only.** Several organizations that we interviewed spoke of virtualizing applications that wouldn't necessarily lead to cost savings (think Exchange) to improve their disaster recovery (DR) and high availability (HA) capabilities along with greater agility. All servers at the YMCA of Metropolitan Milwaukee will be virtual going forward, even if it needs to be a 1:1 relationship.
- **Unify a siloed IT department.** Once you have successfully started to virtualize your environment, use virtualization as a means of unifying a siloed IT department. If your network, server, and storage teams are separate, with little communication and exchange of ideas, a unified infrastructure and operations department will allow you to consolidate tasks, workflows, and steps, and streamline processes. This is especially important when working with a virtual environment. Several of the organizations that we interviewed saw this convergence in their organization:

“We have been evolving the organizational structure over the past few years to leverage skill sets, let people do what they’re best at and be as efficient as possible. To that end, one of the efforts has been to push the network and the data center teams together. Communication and cooperation between those teams wasn’t what it could or should have been — as well as there was duplication of efforts in some cases; for example backups were being managed by both the network and data center teams on two different platforms. Virtualization has been another driver in pushing the two organizations together. While we have been doing AIX and storage virtualization for quite some time, virtualization in the Wintel space with technology like VMware was fairly new to my team, so there was opportunity to leverage knowledge and resources. We are starting to see a blending of technologies, and the lines between traditional network and data centers no longer exist.” (David Levine, vice president, technology infrastructure and end user services, IKON Office Solutions)

- **Take advantage of the economic times and resubmit your proposal.** During tough economic times, many firms are forced to adopt a higher risk tolerance to keep costs down. Take advantage of this and resubmit a proposal for virtualization that was turned down in the past — you may just find with an increased appetite for risk more companies are willing to virtualize critical applications.

## IDENTIFYING YOUR CHALLENGES

Where should you start? Use this diagnostic tool to assess your current capabilities — and opportunities for improvement — and see how you stack up against your peers (see Figure 3). Scores will be calculated automatically for online readers. All scores are anonymous.

**Figure 3** Aligning I&O Around Virtualization Self-Diagnostic Tool

<b>Part 1: Get the business on your side</b>	<b>Yes</b>	<b>No</b>
Have you set up a trial of virtualization in your test or development environments?		
Have you brought in a consultancy to assist with financial analysis?		
Are you using chargeback or memoback as an incentive to go virtual?		
Are you offering better system availability as a reason to go virtual?		
<b>Total</b>		
<b>Part 2: Give your staff the tools they need to be successful</b>	<b>Yes</b>	<b>No</b>
Are you employing a combination of vendor and peer-to-peer training?		
Are you training your staff on soft skills they will need when running a virtual environment?		
Did you let the virtualization subject matter experts emerge naturally?		
Did you bring in a contractor if a task is beyond the skills of your internal staff?		
Are you considering hiring professionals with relevant experience over certified professionals?		
<b>Total</b>		
<b>Part 3: Improve agility by maximizing productivity</b>	<b>Yes</b>	<b>No</b>
Are you growing your environment without increasing your staff?		
Have you optimized your IT management processes for a virtual environment?		
Are you using virtualization as a driver toward more centralized IT services?		
Have you standardized on a hardware configuration or at least a single vendor?		
<b>Total</b>		

47320

Source: Forrester Research, Inc.

## MEASURING YOUR SUCCESS

A common thread among infrastructure and operations departments that successfully aligned their department with virtualization is the ability to quantify improved business performance. There are many metrics on the technology side you can use to measure cost savings: consolidation ratios, deferred capital expenditure on network and server gear, reduced costs for disaster recovery, and reduced data center floor space and power consumption. When looking at people and process metrics, there are only two that are universally relevant and easy to measure. To help you justify and eventually measure the business value of virtualization, infrastructure and operations professionals should target these measurable drivers of ROI:

- **Reduced time-to-market from instant provisioning.** Interviewed organizations cited time reductions from months to hours (including procurement time) on the server provisioning side when using an updated and automated server request workflow.
- **Man-hours saved.** When following the best practices above, the organizations we interviewed saw a huge reduction in the number of man-hours it takes to manage virtual servers. This allowed them to increase their environment by approximately 25% to 60%, without having to hire more staff. The main areas where time can be saved are in provisioning, patching, migrating, and auditing configuration. Provisioning alone at a large US Air Force base went from three-to-four weeks to 1.5 hours, and the server refresh cycle at Graybar went from 65 steps down to only six.

## CASE STUDY

### Case Study: The State Of Indiana Tunes Its I&O Department For Virtualization Success

Prior to 2005, the Indiana Office of Technology (IOT) was distributed over 100 agencies and four data centers. By mid-2006, on Governor Mitch Daniels' orders, the IOT was completely centralized with only one data center and had dropped from 100 system administrators down to 48, saving them millions of dollars a year. How did they do it? Massive amounts of consolidation and virtualization, and, more importantly, an infrastructure and operations organization that is designed to achieve the maximum efficiencies virtualization can offer.<sup>6</sup>

## SUPPLEMENTAL MATERIAL

### Online Resource

The online version of Figure 3 is an interactive self-diagnostic tool that helps clients assess how their current practices stack up against those of their peers.

### Companies Interviewed For This Document

Graybar Electric

I-Business Network

HCL Infrastructure Services Division

IKON Office Solutions

Indiana Office of Technology

Whitney National Bank

Swizznet

YMCA of Metropolitan Milwaukee

## ENDNOTES

- <sup>1</sup> Trust of IT is strongest when players have visibility into what actually occurs, with transparency into IT's performance, and the ability to see how IT meets its commitments. This means that performance has to be measured against clearly set expectations. For the Solid Utility, it's availability, business cycle times, and cost. For the Trusted Supplier, it's development commitments being met at the agreed-upon time and cost. And for the Partner Player, it's IT's ability to help drive business strategy. See the August 15, 2008, "[Improving The Perception Of IT Requires A Focus On Business Trust, Not Just Technology](#)" report.
- <sup>2</sup> A business case built or vetted by a major consultancy has a better chance of approval due to higher perceived credibility of the methodologies and rigor behind the business cases built by these firms. See the June 13, 2008, "[The Forrester Wave™: IT Consolidation Consultancies, Q2 2008](#)" report.
- <sup>3</sup> One of the major challenges of the capacity management function is to gain access to the right information and data. The business doesn't like to share strategic business plans, and service managers aren't willing to share service breaches or SLA performance data. Component information is spread across IT, and on top of that, different subprocesses provide huge amounts of data, making it difficult to make sense of it all. The capacity management needs coordination, correlation, and mindful ownership to ensure that the business is not caught in a situation where inadequate capacity planning is to blame for an outage or disaster. See the December 1, 2008, "[Role Overview: Capacity Manager](#)" report.
- <sup>4</sup> If you want to achieve a much higher ratio of VMs-to-physical host, you can't back up individual VMs like physical servers. First, the cost would be too great because traditional backup vendors have still not adjusted their per-agent pricing models for the virtual world. Second, as you increase the ratio of VMs to physical host, it becomes almost impossible to complete backups during maintenance windows because the physical host simply doesn't have enough bandwidth. In VMware environments, consider backup applications that have native GUI integration with VMware Consolidated Backup (VCB), or look at alternatives such as storage-based snapshots and backup software designed for virtual environments; two examples are Vizioncore vRanger Pro and Veeam Backup. See the January 28, 2009, "[Why Isn't Server Virtualization Saving Us More?](#)" report.
- <sup>5</sup> Storage virtualization based on out-of-band technologies like EMC's Invista and Incipient's Network Storage Platform does not sit in the data flow. Rather, the virtualization intelligence lives in a network-resident controller that instructs the storage infrastructure where to place data. Like most storage virtualization today, out-of-band technologies are focused on improving utilization, migration, and management. See the April 4, 2008, "[Forrester TechRadar™: Infrastructure Virtualization, Q2 2008](#)" report.
- <sup>6</sup> Forrester published a detailed case study outlining the Indiana Office of Technology's use of aligning its infrastructure and operations department with virtualization best practices. See the March 20, 2009, "[Case Study: The State Of Indiana Tunes Its I&O Department For Virtualization Success](#)" report.

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Making Leaders Successful Every Day

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