THE State of the Data Center

Sustaining Continuity
and Meeting Demands for Better Service

An exclusive CMP Research survey

Even as data center managers innovate with virtualization, embedded management and blade servers, their chief concerns remain focused on preserving business continuity, keeping the enterprise secure and meeting accelerating service demands.

Sustaining Continuity and Meeting Demands for Better Service

"Certain innovations — notably virtualization, embedded management and blade servers — are being added to data center managers' repertoire of problem-solving solutions."

Plenty of reasons drive today's quickly-changing dynamics of end-user demand for information technology: the Internet, e-mail, Google, WiFi, 24/7 shopping and banking, instant messaging, the growing variety of real-time applications, and on and on.

For data center managers, however, it quickly adds up to the need to maintain an information and communication infrastructure that is, above all else, continuously available, reliable and secure. An infrastructure that delivers the right services to the right people at the right time, no matter what.

This means that data center managers are caught in a conundrum: They need to innovate to meet the lightning-fast changes in end-user demands for new services and new capabilities — but they dare not try anything that compromises existing systems, applications and networks. All the while, the data center budget is not growing; it may even be shrinking.

This is the context in which CMP Research has conducted its second-annual online survey of 301 data center professionals to discover their view regarding the State of the Data Center. This November, 2006 can be compared with last year's, since many of the same questions were asked in both.

While many of the general trends identified last year hold today, it's also true that certain innovations — notably virtualization, embedded management and blade servers — are being added to data center managers' repertoire of problem-solving solutions. And for good reason. The challenges confronting the data center are vexing.

The greatest IT challenges

The respondents to CMP's new State of the Data Center survey noted more than 100 "biggest challenges" with which their IT organizations are contending. While the challenges respondents describe reflect the particular tribulations faced by each of their organizations, it's possible to distill them into eight major categories that reflect the current state of the data center. (See Chart 1 on the next page)

Methodology

More than 300 *Network Computing* and *InformationWeek* readers completed an online CMP Research survey in November on The State of Data Center, to see how data center IT issues have changed over the past year. The data collected from 450 respondents was tabulated, cleaned, and analyzed, resulting in 301 qualified interviews, which are the basis for this report. At a 95% confidence level, 301 surveys have a confidence interval of ± 5.6%. The survey respondents represented a cross-section of industries.

Notably, the top five categories — security, meeting demand, costs, backup/availability and server management — account for more than two-thirds of respondents' concerns.

Cost and server management (together comprising 23 percent of noted challenges) mirror the inevitable and perpetual scrambling that occurs in the bowels of the IT organization — e.g., the ability to stretch the budget, puzzling over how best to manage remote locations, consolidate operations on fewer devices, etc. Failure here creates unnecessary expense and hassle, but life will go on.

However, challenges in security, meeting demand and backup/availability (45 percent of the total) signal something much more serious — the criticality of issues directly related to IT's ability to generate and sustain the services needed to keep the business in business. Failure in these closely connected realms has the potential to threaten the organization's very survival:

• Breaches in the security of an organization's complex networks and systems — anything from

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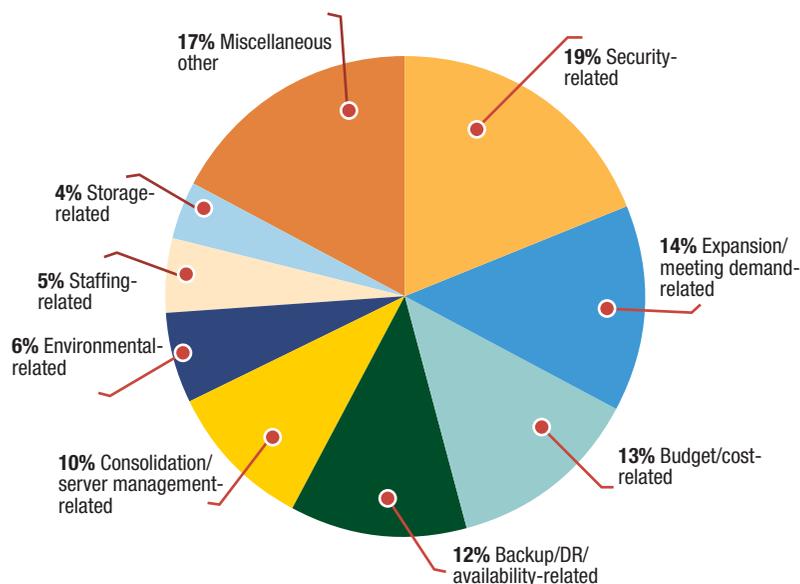
viruses and spyware, to breakdowns in patch management to network vulnerabilities to user authentication problems — can stop the business in its tracks and subject it to a variety of liabilities. Perhaps security has become data center managers' greatest challenge simply because security must be a foundational consideration in every single data center decision.

• Finding ways to cost-effectively meet the demand for information and the technology that makes it competitively useful requires that data center managers continually juggle bandwidth, keep up with quickly evolving technologies, find the necessary physical space, educate end-users, and much more.

• Destroyed or corrupted data and downed systems and networks quickly translate into lost revenue, lost productivity and lost customers. As organizations offer the ability to transact business 24/7, customers are becoming less and less patient with service outages, and data centers must find ways to maintain uptime round-the-clock.

The dominance of these business-critical IT challenges in the
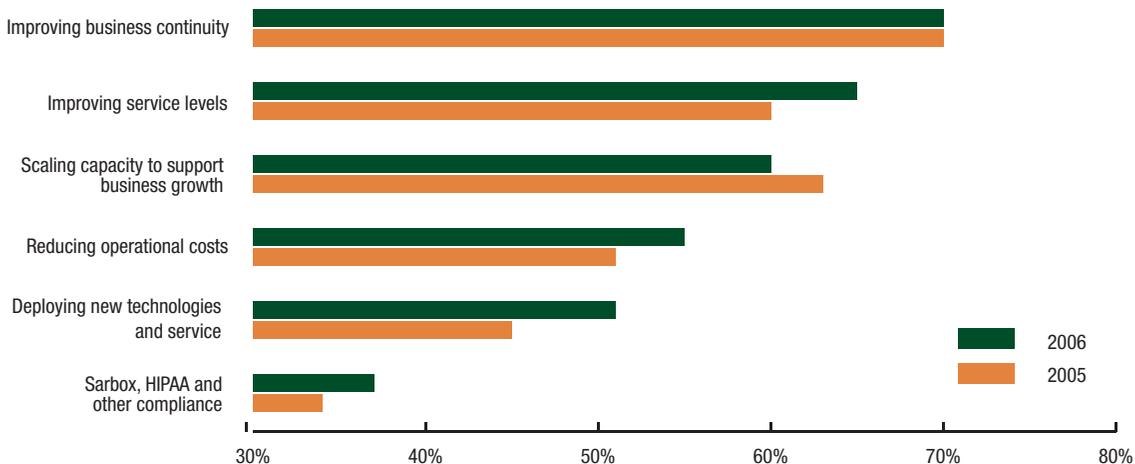
Chart 1: IT's Biggest Challenges
Security, meeting demands and budget considerations top the list of IT organization concerns

17% Miscellaneous other
19% Security-related
14% Expansion/meeting demand-related
4% Storage-related
13% Budget/cost-related
5% Staffing-related
6% Environmental-related
10% Consolidation/server management-related
12% Backup/DR/availability-related

Source: The State of the Data Center, CMP Research, November 2006

Chart 2: Key Data Center Issues
Better business continuity remains the number 1 data center
issue, followed by improving service levels and scaling to support business growth

Issue	
Improving business continuity	
Improving service levels	
Scaling capacity to support business growth	
Reducing operational costs	
Deploying new technologies and service	
Sarbox, HIPAA and other compliance	

Legend: ■ 2006 ■ 2005

X-axis: 30% 40% 50% 60% 70% 80%

Source: The State of the Data Center, CMP Research, November 2006

minds of data center managers suggests that many organizations have reached a pivotal strategic point. To thrive and grow, they have begun to expect IT capabilities that, too often, data center managers struggle to deliver.

What matters in the data center?

As the CMP survey drilled down to important data center issues, the same themes emerge. At the top of the list in 2006, as in 2005, is improving business continuity. (See Chart 2)

What's shifted somewhat over the last year, however, is how companies think about doing that. In 2006, two issues — improving service levels and deploying new technologies and service — have become noticeably more important.

When the latter, deploying new technologies and service, is considered alongside the top three elements in Chart 2 (improving business continuity and service levels and scaling capacity to support business growth), it's clear that the data center has received a mandate to support the business in a dramatically new fashion. Yet as Chart 2 indicates, this mandate must be fulfilled while lowering costs.

Under such circumstances, it follows that regulatory compliance concerns are starting to attract data center managers' attention. Like security and continuity issues, compliance is a foundational concern that must be addressed with every new system, application and service.

Top staffing concerns

Of course, the most significant data center budget line item is staff. Last year, respondents cited 'Insufficient payroll budget to meet our real staffing level requirements' as the chief staff-related problem. This year, that

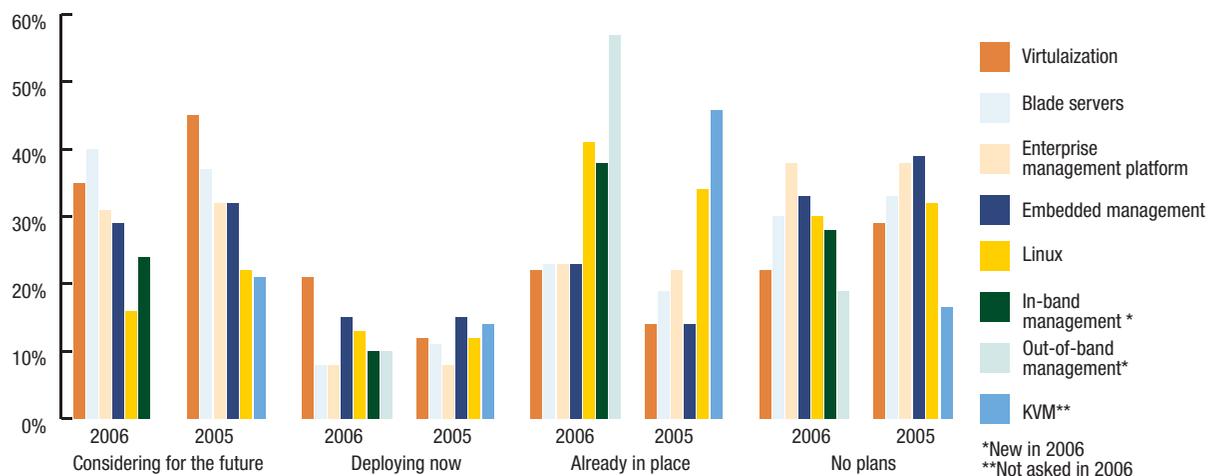**Chart 3: Top Six Data Center Staffing Issues**
How respondents rank data center staffing issues point to the need for tools that improve productivity

2006 Rank	2005 Rank	
1	2	Systems administrators spending too much time on non-critical tasks
2	4	Systems administrators need better tools
3	1	Insufficient payroll budget to meet our real staffing level requirements
4	3	Systems administrators need more training
5	5	Difficulty finding and hiring qualified systems administrators
6	6	Difficulty retaining experienced systems administrators

Source: The State of the Data Center, CMP Research, November 2006

Chart 4: Key Data Center Technologies
Innovative technologies join proven ones in data center implementations

Legend:
- Virtulaization
- Blade servers
- Enterprise management platform
- Embedded management
- Linux
- In-band management *
- Out-of-band management*
- KVM**

*New in 2006
**Not asked in 2006

X-axis categories: 2006 / 2005 (Considering for the future), 2006 / 2005 (Deploying now), 2006 / 2005 (Already in place), 2006 / 2005 (No plans)

Source: The State of the Data Center, CMP Research, November 2006

concern has dropped in importance (to third place) as the battle for more staff dollars has been abandoned for finding ways to make do with less. (See Chart 3)

Hence, what's on respondents' minds is how much time — too much! — system administrators spend on non-critical tasks (their number 1 issue) and their need for better tools (their number two issue).

What's been implemented, what hasn't

Although respondents say systems administrators need better tools, it's interesting to note that compared to last year, those responding to the 2006 survey report slightly more often that they have a lot of "shelfware" management tools sitting idle and unused.

In 2006, 59 percent of respondents acknowledge that they have shelfware. Perhaps this is why more than 40 percent of 2006 respondents — slightly more than last year — have shied away from major infrastructure retooling, such as a significant data center move, server consolidation and/or other re-architecting systems infrastructure. Nearly as many eschew plans to deploy enterprise management platforms (though 31 percent say they're considering such platforms for the future).

So the question is: What are the right tools for data center managers? The answer is: Proven tools, as

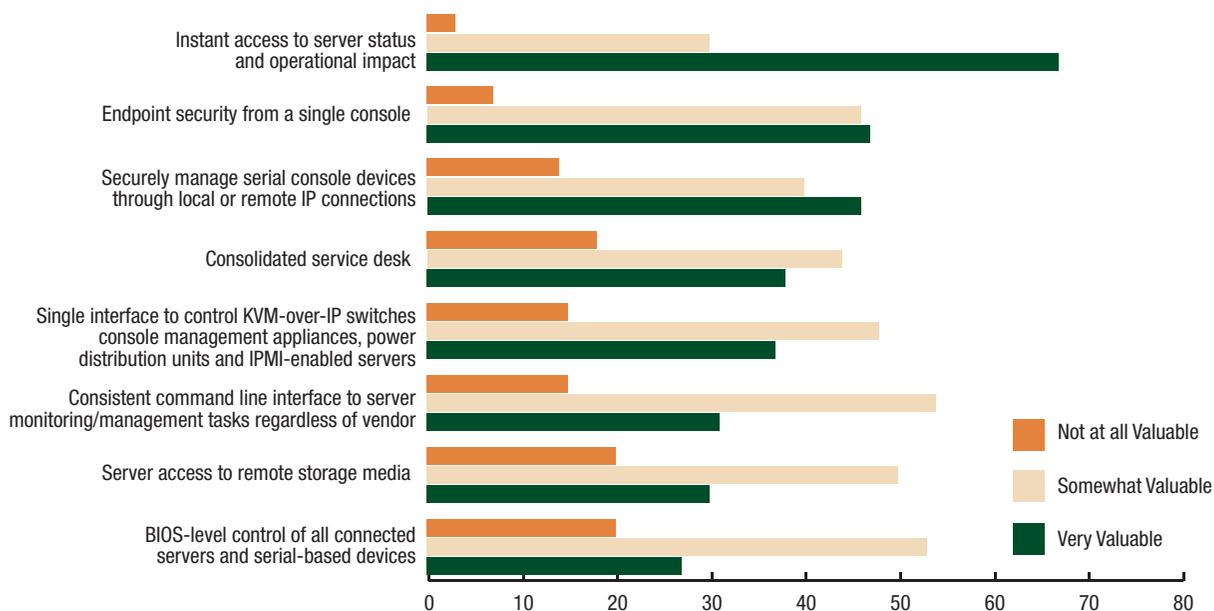well as some newer technologies, notably virtualization and embedded management. (See Chart 4)

Blade servers are catching on, too, albeit more slowly — 40 percent of respondents say they're considering blade servers for the future, while 31 percent have either deployed them or are currently doing so.

In 2006, the CMP survey respondents report improving data center operations by:

- **Virtualizing**. Many of those who were considering virtualization for the future a year ago have put it in place. The portion of respondents who have already implemented virtualization has increased by 57 percent from 2005 to 2006, and the share of respondents now deploying it has grown by 75 percent during the same period. Altogether, 43 percent of 2006 respondents either have virtualization in place or are currently deploying it. Another 35 percent are considering it for the future.

- **Deploying out-of-band and KVM technology** to streamline data center management operations. More than half of 2006 respondents — 57 percent — have out-of-band management (KVM, serial console) already in place. Significantly more 2006 respondents — 38 percent — indicated they depend on KVM technology to streamline data

Chart 5: Comparing the Value of Data Center Capabilities
What's most valuable in today's data center are solutions and tools that improve staff productivity and help deliver business services

Instant access to server status and operational impact

Endpoint security from a single console

Securely manage serial console devices through local or remote IP connections

Consolidated service desk

Single interface to control KVM-over-IP switches console management appliances, power distribution units and IPMI-enabled servers

Consistent command line interface to server monitoring/management tasks regardless of vendor

Server access to remote storage media

BIOS-level control of all connected servers and serial-based devices

■ Not at all Valuable
■ Somewhat Valuable
■ Very Valuable

Source: The State of the Data Center, CMP Research, November 2006

center management operations (up from 31 percent in 2005).

- **Using in-band management (RDP, VNC, WMI).** Nearly three-quarters of 2006 respondents — 72 percent — either have implemented in-band management, are deploying it now, or are considering it for the future.
- **More often purchasing/requiring embedded management technology** (i.e., IPMI, DRAC, ILO, etc.). In 2006, 20 percent of respondents indicated that all the servers they now purchase must have embedded management technology (up from 14 percent in 2005). The share of respondents with these technologies already in place has climbed by 64 percent over the last year, and in 2006, 38 percent of respondents either have deployed or are now deploying these technologies.
- **Opting for blade servers.** The share of respondents who now have blade servers in place has increased by more than 20 percent over 2005.
- **Embracing Linux.** Fully 70 percent of 2006 respondents either have Linux in place, are deploying it

now, or are considering it for the future. The portion of respondents who have put Linux in place over the last year rose by more than 20 percent.

Thanks to deployment of both proven technologies like KVM, Linux and in-band management tools, as well as more innovative virtualization and embedded management technologies, the ratio of data center systems administrators to servers has begun to decline in some organizations.

While most respondents indicated that the ratio has remained the same from 2005 to 2006, more respondents reported slight decreases in the ratio and fewer noted slight increases, perhaps suggesting that the benefits of the data center technologies described above are beginning to have impact.

Data center capabilities that count

As pressure mounts to do more with less, certain data center capabilities pique data center managers' interest.

Fully two-thirds of 2006 survey respondents affirmed that instant access to server status and operational impact would be very valuable to their data
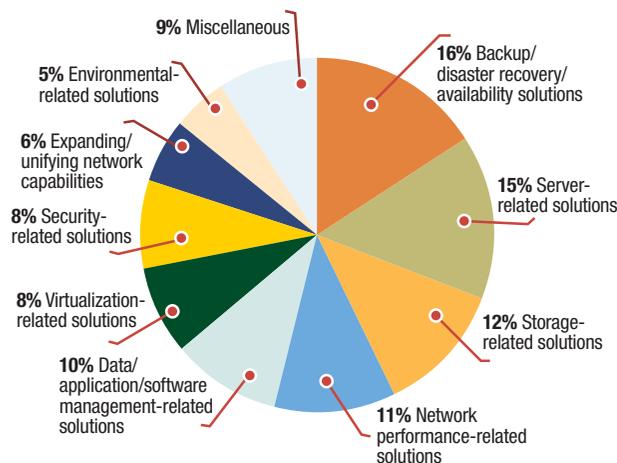
> "What's on respondents' minds now is how much time — too much! — system administrators spend on non-critical tasks and their need for better tools."

center operations, and another 30 percent indicated this capability would be somewhat valuable. (See Chart 5)

A couple of other capabilities — dealing with endpoint security from a single console and securely managing serial console devices through local or remote IP connections — were considered very valuable by nearly half of the respondents.

What do these capabilities have in common? Every one has the potential to significantly boost staff productivity and improve the ability to maintain business services and data center uptime by centralizing control of both remote and local data center devices.

As more and more of these capabilities become reality in data centers, chances are the slight shift in the ratio of systems administrators to servers evidenced in the 2006 survey will accelerate — even as data center technicians support greater numbers of business-critical services.

The data center shopping list

When asked which data center technologies they're most interested in acquiring in the next 6-12 months, respondents came up with a long list — no fewer than 340 distinct technologies/capabilities. The standouts on this list were virtualization and virtual servers,

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Chart 6: What Data Center Managers Want Most
Technologies that keep the data center up and running top 2007 acquisitions wish list

- **9%** Miscellaneous
- **5%** Environmental-related solutions
- **6%** Expanding/unifying network capabilities
- **8%** Security-related solutions
- **8%** Virtualization-related solutions
- **10%** Data/application/software management-related solutions
- **11%** Network performance-related solutions
- **12%** Storage-related solutions
- **15%** Server-related solutions
- **16%** Backup/disaster recovery/availability solutions

Source: The State of the Data Center, CMP Research, November 2006

Proven data center technologies

Out-of-band technology

During a network failure, the device that system/network administrators use for sending and receiving messages – the system console, which also is network-dependent – becomes useless. Out-of-band management provides system console functionality even in the event of primary network subsystem (hardware and/or software) failure.

This is accomplished via a console server, which provides serial port connections to other devices – e.g., servers, routers, or switches – so these devices can be accessed via a serial link (modem, telnet, ssh), allowing remote users to log into the various consoles. Such out-of-band management can also be achieved with a remote access card (RAC), which contains its own processor, memory, battery, network connection, and access to the system bus.

KVM technology

To ease administration of multiple data center servers, keyboard-video-mouse (KVM) appliances are used so data center staff can connect to any server from a single workstation.

By linking a monitor, keyboard, and mouse to a KVM device, then using special cables to connect the KVM device to the servers, administrators can control many servers, switching from one to another via buttons on the KVM device or keyboard commands. Remote KVM device control of servers is possible using the Internet protocol (IP); this is KVM-over-IP, which delivers KVM functionality without cabling limitations.

Virtualization in the data center

In today's data centers, servers are dedicated to running a certain service. Since those servers must handle peak loads, the service ends up being over-provisioned the rest of the time, when loads are not at peak. Thus today's data centers typically must maintain more computing resources than they need.

Virtualization – an external interface that hides an underlying implementation – has begun to transform how data centers are conceived and managed. Data center virtualization, in which many physical servers are consolidated into fewer servers that in turn host virtual machines, means CPU and storage resources can be clustered in a single 'cloud' and then flexibly, dynamically partitioned according to application needs.

In addition, operating system migration technologies enable the movement of virtual machines from one piece of hardware to another. The result: services provided by the data center no longer need to be provisioned with dedicated hardware silos able to handle peak loads, but only for an aggregate load, since all data center resources are available to meet service needs as required.

which together were named by 8 percent of respondents; storage area networks, noted by 5 percent of respondents; and blade servers, cited by 4 percent.

By distilling the list into broad categories, the survey results yielded a better sense of what IT managers will be shopping for over the next several months. (See Chart 6)

Not surprisingly, they'll be sticking to the basics that will enable the data center to sustain and expand its delivery of critical business services. Given that business continuity is the number one data center issue cited by the respondents to CMP's State of the Data Center survey in both 2005 and 2006 (see Chart 2), it makes sense that backup/disaster recovery/availability solutions would top the data center shopping list.

The next four categories — solutions that are server-, storage, network performance- and data/application/software-related — show data center managers' efforts to line up the technologies needed to meet the needs of the business.

While data center managers cannot afford to deploy bleeding-edge technologies that can risk network and system continuity, security and performance, they are acquiring solutions that make data center management less costly and more productive.

Some of those solutions — such as virtualization, embedded management technology, and blade servers — are at least leading edge. Other solutions are long proven and well-established in data centers for good reason.

Out-of-band management solutions (based on KVM and serial consoles) that enable access to servers when the network is down are present in a majority of data centers. In-band management and Linux are even more prevalent.

These types of data center solutions — both the innovative and long-proven — emphasize secure, single-screen, centralized control as well as scalability, flexibility, and remote access. By incorporating these kinds of solutions into their highly complex, quickly evolving IT environments, managers can help ensure the data center reliability and stability on which the business so profoundly depends. And they can, at the same time, begin to achieve the productivity and efficiency improvements that they so sorely need.