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Seeding the Cloud Enterprises Set Their Strategies for Cloud Computing





KEY FINDINGS

- Cloud computing projects are still at an early stage at most companies if they are happening at all. However, the overwhelming majority of IT executives have at least begun evaluating the benefits of cloud technology, with much of their focus on "private cloud."
- Cloud technology is seen by many IT executives as a way of continuing to provide high service levels while cutting infrastructure and capital costs.
- Investments in data-center consolidation and virtualization have laid a foundation for many IT organizations to shift some operations to the cloud.
- The obstacles to cloud computing remain substantial—including concerns about security, about the cloud's ability to handle legacy applications, and about IT staff's willingness to work in a new way and re-orient its priorities.

Enterprise information technology (IT) departments are coming under greater pressure than ever to reduce infrastructure costs, manage capital expenditures, and consolidate operations, while at the same time providing higher and more sophisticated levels of service and support to the lines of business.

To manage these seemingly competing forces, IT executives are increasingly turning to a new wave of solutions that can reduce costs and footprints while providing a more flexible, efficient, and automated method for delivering applications to end users. Chief among these is cloud computing.

To gain a greater understanding of how enterprises are approaching these issues, Forbes Insights surveyed 235 CIOs and other IT executives at leading U.S. companies with annual sales of more than \$500 million. These results were complemented by a series of one-on-one interviews that provided first-hand examples of some of the issues facing IT executives, while also helping to identify best practices from early-stage cloud adopters. At its most basic, cloud computing can be used to represent the shift away from traditional IT consumption models to delivering IT as a service. For purposes of this study, cloud computing falls into two categories:

- Public cloud, where infrastructure and applications are delivered to multiple clients by a third-party, and housed and managed in that provider's data center
- Private cloud, in which infrastructure and applications are managed and controlled by the IT organization using them, whether developed internally or delivered by an external services provider

On the cusp of cloud

The concept of cloud computing has sparked enormous interest in the enterprise, but it is also clear that companies are still crafting their strategies and testing their options to decide whether this will be an effective way for them to provision applications and services.

That cloud computing still faces some adoption hurdles is evident from the Forbes Insights survey. Clearly, enterprises remain more interested in private cloud than its public counterpart-more than a third said they had no plans for public cloud computing, while just 16% said they had no plan to use private cloud. (Figs. 1 and 2) Still, fewer than 10% of respondents have any kind of comprehensive strategy in place regarding either type of cloud. Most remain in the evaluation phase.

Nevertheless, IT executives see some big benefits in cloud computing. Ninety-two percent say cloud computing could be "somewhat" or "very" useful in reducing infrastructure costs. (Fig. 3) Increased efficiency is a big part of this, with 88% saying the cloud is a good way of dynamically allocating computing power, and more than 80% saying the cloud can reduce the cost of licensing applications and make it easier to maintain and upgrade them.

Eight of ten respondents see the cloud as being useful for data backup. The Michigan Department of Information Technology (MDIT) is already looking for a way to exploit this potential; it has launched a pilot in which it will offload some less-sensitive categories of data (like soil samples and

"We're building the ability for our customers to save hundreds of thousands or millions of dollars over the course of years." -Dan Lohrmann, MDIT

student dissertations) to external storage providers, a move that may reduce some of its storage costs by a factor of 10. "We're going to learn what works and what doesn't work," said Dan Lohrmann, chief technology officer of MDIT, which services 55,000 employees. "We're building the ability for our customers to save hundreds of thousands or millions of dollars over the course of years."

Like MDIT, Norton Healthcare, which operates Kentucky's biggest hospital network, has no immediate plans to entrust its front-line data to an external provider. But CIO Joe DeVenuto can see the day, five or seven years out, when he might transfer his primary data center, currently in the basement of one hospital, to a hardened facility with cement walls and ceilings a few miles away. At that point, he said, it may make sense to close the basement data center, which he says is vulnerable to floods, and use external cloud providers for the backup data center. "It's always our responsibility to look and see whether



FIGURE 1. Where does your IT organization stand with respect to private cloud

FIGURE 2. Where does your IT organization stand with respect to public cloud



FIGURE 3. Please rate how useful cloud computing could be in meeting the following IT objectives.

"It's always our responsibility to look and see whether there's an opportunity in the cloud to increase the reliability of service, or reduce cost, or reduce the risk of disaster." —Joe DeVenuto, Norton Healthcare

there's an opportunity in the cloud to increase the reliability of service, or reduce cost, or reduce the risk of disaster," DeVenuto said.

Those benefits, of course, are all on the technology infrastructure side. The cloud also has some softer benefits. More than two-thirds of respondents, for instance, said the cloud, with its roots in Internet standards and Internet-style openness, could improve internal collaboration, as well as communication with business partners and suppliers.

Since 2007, for instance, the construction company Bechtel Corp. has been using a cloud approach for its business, in which it could as easily end up building a pipeline in Alaska, a power plant in Libya, or a commuter railway outside of London. Bechtel's projects typically have a "nomadic" work force—consisting of some full-time employees, some consulting contractors, and some people from the supply chain or end customer—and "when you put that all together, you get a few challenges," said Bechtel CIO Geir Ramleth. By using a cloud approach in its technology applications, Ramleth said, Bechtel is able to make "services available for anybody at any time regardless of their background or of what hardware or software platforms they use."

Why cloud computing resonates in the business suite

Not coincidentally, these perceived benefits dovetail with a changed set of expectations that business leaders have of the technology function. Almost all surveyed enterprise CIOs and IT executives (89%) said they are under pressure from CEOs, CFOs and senior management to reduce infrastructure costs and capital expenditures in 2010. (Fig. 4)

This pressure is clearly guiding IT priorities and spending in 2010. Respondents named data center/IT operations consolidation and virtualization as their top two priorities and budget items for the coming year. (Figs. 5 and 6) While cloud computing just cracked the top five in terms of priorities, and came in sixth as a budget item, both consolidation and virtualization are seen as natural precursors to a cloudbased strategy. FIGURE 4. Is your IT department coming under pressure from senior management to reduce infrastructure costs or capital expenditures in 2010?



BECHTEL AND THE PRIVATE CLOUD

Traditionally, when Bechtel started a construction project, it would dispatch a team of IT staffers to that location to set up the computers and software, and test the system. A month or two later, the system would become operational, and Bechtel's engineers and construction experts, along with outside contractors, would begin using it.

It was an inefficient process, from both a cost and management perspective, and in 2005, Bechtel CIO Geir Ramleth began looking for a better way to handle his company's far-flung IT projects. The IT models he decided to emulate were those in place not at traditional companies but at some of the most successful consumer Internet companies. Google, Amazon.com and Salesforce. com, in particular, had a cost-efficiency and an expandable approach to adding new capacity (it made little difference where the user was located) that Ramleth believed suited Bechtel.

The result is Project Services Network (PSN), a three-year-old private cloud that has allowed Ramleth—at a time of intense margin pressure for his company—to continue to support Bechtel projects around the world, while spending far less on software development and infrastructure.

The move to PSN required Ramleth to become more disciplined about technology. For instance, prior to PSN, Bechtel used about 1,600 business applications, and had an average of four versions per application. As part of PSN, it has winnowed down the number of applications to 230, with an average of three or four versions per application. Bechtel also has reduced its number of data centers to three from 27. The three—in the U.S., U.K., and Singapore—take up about 1,000 square feet, versus 35,000 square feet when there were 27.

"We wanted to find both higher efficiencies and more simplicity," Ramleth said. "Driving down the number of applications, the number of locations, and

the number of physical boxes is important for doing that. The fewer locations you have, the less chance you have to waste, and the less chance you have to mess something up."

To show how software deployment has improved, Ramleth described changes in Infoworks, a proprietary Bechtel workflow document management system that connects the engineers working on projects to construction managers, clients, and others. Previously, Infoworks was a point solution requiring installation at each new project site. Now, Bechtel operates it as a centralized service that can be accessed from a browser. The Bechtel setup for Infoworks is very like what the CRM vendor Salesforce.com does with software, Ramleth said, leveraging a single set of code over tens of thousands of customers using a multi-tenant architecture.

In theory at least, there is no reason why Bechtel, if it was short on processing power, couldn't use someone else's servers to help run Infoworks, which is very resource-intensive and requires a lot of storage. Ramleth already uses an external storage provider when Bechtel has a spike in demand for processing power, usually because of some sort of development work the company is doing or test it's running. And Ramleth predicted that this tactic—of running one's servers in someone else's data center—is going to become increasingly common. He called this "the virtual private cloud."

"Once you have reached the point of dealing with this as a cloud service, actually adopting other public services, versus the ones that you're doing yourself, is not that big a shift," he said. "You start adhering to the same form of architecture, the same form of technology, the same form of standards, and the same form of operating principles. You pretty much look like peers. The demarcation line between private clouds and public clouds starts to get blurry. At that point it becomes extremely interesting."

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FIGURE 6. Which technologies will see the greatest amount of IT investment in

And it isn't only senior management that is pressuring IT about costs; 87% of respondents said business-unit managers are more apt these days than in the past to question chargeback levels or balk at the IT allocation in their budgets. (Fig. 7)

In addition, nine in 10 respondents said their businessside colleagues now expect them to be able to increase or decrease service levels dynamically. This, of course, is one of the promised benefits of cloud computing—an expansion and contraction of resources as befits the need—and suggests the increasingly high expectations that businessunit managers have of the technology function.

Greater speed is also part of that expectation; 87% of IT respondents say they are being asked to deliver applications more quickly than in the past. This expectation goes a long way toward explaining the sustained growth that some public cloud providers have enjoyed early in their histories. CIOs have turned to these providers partly to be able to satisfy the speed imperative: to deliver basic applications like CRM to business units in a matter of days or weeks, not months or years.

Virtualization lays the foundation

Among current technologies coming into the mainstream, virtualization is clearly seen as the antecedent to private cloud computing. A shift to a private cloud-based solution has the potential to increase the number of servers that enterprises will need in their data centers. Using "virtual machines" instead of discrete hardware can allow a company to pool its resources rather than operate discrete units, providing greater flexibility in capacity across applications, better monitoring, and more efficient backup—certainly requirements for an effective cloud environment.

Among the organizations surveyed, nearly half (48%) had already virtualized at least a quarter of their organization's servers. (Fig. 8) With virtualization as a top IT priority in 2010, that figure could certainly increase over the coming year.

Companies also appear satisfied with their virtualization results, as 80% indicated that their virtualization initiatives have met or exceeded their expectations. (Fig. 9)

"Certainly most of the companies I speak to have made significant inroads into data center rationalization," said Sunoco CIO Peter Whatnell, whose position as president of the Society for Information Management, a trade group, puts him in touch with a wide range of enterprise IT executives. "Virtualization is another aspect of this standardized approach," he adds. "Most people have made significant progress into virtualizing their data centers." Sunoco, a \$54 billion petroleum company, is not limiting its virtualization program to the data center. It is trying to virtualize its desktop environment, by phasing out its one-PC-per-desktop approach with a setup of thin clients.

"Certainly most of the companies I speak to have made significant inroads into data center rationalization," —Peter Whatnell, Sunoco

In theory, Whatnell said, as many as a dozen thin clients could be supported by a single back-end PC. "It's primarily a matter of cost," he said. "For us, the desktop is the new frontier in terms of cost-reduction."

Virtualization and data center consolidation are also critical to the other organizations interviewed. Bechtel has reduced its data centers to three from 27; the Michigan Department of Information Technology is also down to three data centers, from 39 a few years back. At Norton Healthcare, approximately 50% of the servers are virtualized—well above the average of most organizations. "This does, in fact, enable us to have choices as we move forward," said Norton Healthcare CIO DeVenuto.



FIGURE 8: What percentage of servers in your organization are virtualized?

FIGURE 9. How would you characterize the results of your virtualization initiatives?

Other blocks of the cloud foundation

As organizations move toward a more cloud-based infrastructure, they will also need to consider a range of other issues beyond their data centers. In particular, with mission-critical applications being delivered over the public IP infrastructure, they will need to keep a close eye on network availablity, security, quality of service, and compliance.

The survey asked IT executives about handful of these foundational issues:

Third party contracts: The performance of third-party service providers can have a significant impact on the effectiveness of a cloud strategy. (Fig. 10) Yet many companies still don't require specific service-related covenants in their contracts. For example, fewer than half of respondents include peak load capacity guarantees or network routing redundancy covenants in their contracts.

Disaster recovery and security planning: Most respondents appear to take a proactive stance toward disaster recovery and security planning, updating their plans annually or more frequently. (Figs. 11 and 12) Still, 14% of respondents said their companies update their disaster recovery plans every two years or less frequently, and 13% take the same timing to their network security plans. **FIGURE 10:** When working with third-party services providers, which of the following covenants are required in a contract?



FIGURE 11: About how frequently does your organization update its disaster recovery plan?

23%

· Quarterly or more frequently

Every 6 months

Every 2 years

every 2 years

Don't know

Less frequently than

Annually

21%



FIGURE 12: About how frequently does your organization update its

comprehensive network security plan?

Security, control, staff know-how remain obstacles

For the most part, however, readiness for the cloud hasn't translated into usage...yet. Only 32% of IT executives said their organizations currently deliver services through a private cloud they have developed, or have a definite plan to do so. Hard-and-fast public cloud plans and projects are even scarcer—only 27% of respondents have them. And fewer than 20% of respondents see cloud computing getting a significant share of their IT investment dollars this year.

Security remains the top concern about both public and private cloud computing. (Figs. 13 and 14) This concern is particularly pronounced for public cloud, as about three-quarters of respondents named it as a concern, while more than half cited control (or a lack thereof) as a concern. Control is much less of a concern (cited by only 26% of respondents) in the context of private cloud.

"What are you going to do with the data? How do I know you're complying with what you say?" said Michigan CTO Lohrmann, ticking off the questions he thinks about when he evaluates prospective public cloud vendors. "What happens if you go bankrupt? Who owns the data? Do you do background checks on your own people?"

"The biggest obstacle you have is really to get people to think differently."

-Geir Ramleth, Bechtel

"You cannot outsource the responsibility," Lohrmann added. "If there's a hack and it's traced back to you, it's your neck."

In addition to security, insufficient staff expertise and the difficulty of integrating legacy systems loom as obstacles to private clouds; these concerns were cited by 42% and 40% of respondents, respectively.



FIGURE 13: What are the top concerns you might have about implementing a *public* cloud computing solution at your organization?

FIGURE 14: What are the top concerns you might have about implementing a *private* cloud computing solution at your organization?



Indeed, some IT staffers regard the very idea of cloud computing as a threat—a move away from technologies or skills that may previously have been their meal tickets within the organization. "The biggest obstacle you have is really to get people to think differently," said Bechtel CIO R amleth.

When the electronics outsourcing company Sanmina-SCI Corp. started a transition to Google's Gmail, having decided it no longer needed to maintain a corporate email system internally, there was a "fair amount of pushback" from within the IT organization, recalled CIO Manesh Patel. "They didn't really understand why we would want to change." The buy-in eventually came, but the resistance that greeted the organization's adoption of a public cloud strategy, in just one sliver of its operation, is not uncommon. "It's something other organizations should be aware of," Patel said.

TURNING TO THE CLOUD FOR A BASIC SERVICE

Perhaps the clearest indication of enterprises' willingness to consider cloud computing is the difference in attitude that many of them are exhibiting toward web-based email services, including Google's Gmail.

Three years ago, enterprise use of Gmail was largely limited to non-profit organizations, including universities, and to very small companies. Now, Gmail is under consideration at many established for-profit companies that would have previously shunned it.

A case in point is the electronic manufacturing services company Sanmina-SCI Corp. At the end of 2009, \$5.2 billion Sanmina rolled out Gmail to more than 15,000 employees around the world, the last step in a phased rollout that had started as a three-person proof-of-concept 18 months earlier. Sanmina CIO Manesh Patel kept a checklist: Gmail had to be secure; it had to work well with the company's Microsoft applications; it had to do a good job of supporting BlackBerrys. When it proved up to these tasks, Sanmina migrated—a move Patel said will save the company \$1.5 million a year.

Indeed, the cost-of-ownership argument was how Patel gained approval for the switch from senior management. That did not resonate in quite the same way with Patel's own staff, some of whom were concerned about the diminished relevance of skills they had spent months or years honing. "What I communicated internally is that yes, it's different, but there's also the potential to really spend more of our time and energy working with our employees to help them be more productive," Patel said

"Overall, that [line of reasoning] has worked out pretty well," Patel added. Sanmina is now considering replacing other applications with cloud solutions, especially some applications surrounding the company's core ERP system. "They could be internally developed solutions, or they could be public. Maybe you have a mixed environment," Patel said. "I see a role for all three."

Why cloud is in the forecast

Enterprise technology often follows a familiar arc. New technologies come out, get hyped, attract some early adopters, and prompt the inevitable skepticism. In the last 25 years, localarea-networks, PDAs, grid computing, the Internet, open source, mobility, and virtualization have all gone through hype-deflate-adoption cycles. Rarely does any new technology become a fixture of enterprise IT overnight. Sometimes it disappears. Often, it is hard to know for sure what will catch on.

CIOs say, however, that cloud computing fits with some fundamental changes that are occurring in enterprise IT. One is the need for greater cost efficiency. A second is the move toward standardized technologies and platforms.

Traditionally, the IT departments of big organizations have employed cubicles full of software coders whose job was to bridge gaps between legacy applications, or create other specialized applications. They also employed support technicians who would come around and update software, or recover the data from a corrupted hard drive, at a chargeback cost to the department of \$70, \$80 or \$90 an hour. "We did [those things] because we could," said Sunoco CIO Whatnell, speaking not of his own company but of big IT departments generally.

Financial pressures in the last two and a half years have changed that, Whatnell said, and are pushing IT into a new role of ensuring that the services get delivered, versus the old role of constructing and operating those services itself.

He said that companies would initially use the cloud for undifferentiated services such as email, where some outside vendors already offer excellent service, often at a cost that enterprises can't match. After that, enterprises will "look up the chain" to applications in HR and procurement, among other areas. Improved systems for data security will accelerate the interest.

"We just found that there were very few SaaS (software as a service) companies that could supply what we needed for our industry." —Geir Ramleth, Bechtel

This push for standards and efficiency explains, in part, how Bechtel's IT department has evolved from a distributed operation with 27 data centers and a practice of parachuting in workers to build temporary systems for each project, to a centralized operation with just three data centers and a common base of code that gets leveraged for each new project. If it is largely a coincidence that Bechtel opted to set up these services on its own—"we just found that there were very few SaaS (software as a service) companies that could supply what we needed for our industry"—there was nothing accidental about the approach selected by CIO Ramleth. "I think if you took any company that started from scratch today, they wouldn't do IT in the old way," he said. "They would all do it, to one degree or another, using the cloud."

METHODOLOGY

The information in this report is based on the results of a survey and one-onone interviews conducted by Forbes Insights in January and February of 2010.

Forbes Insights surveyed 235 IT executives at companies with annual sales exceeding \$500 million. More than 90% of the respondents held the title of VP or director of IT or higher.

In addition, detailed on-the-record interviews were conducted with five individual executives fitting the survey profile: They were:

- Joseph DeVenuto, CIO, Norton Healthcare
- Dan Lohrmann, CTO, Michigan Department of Information Technology
- Manesh Patel, CIO, Sanmina-SCI
- Geir Ramleth, CIO, Bechtel
- Peter Whatnell, CIO, Sunoco

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