



A REPORT BY **HARVARD BUSINESS REVIEW ANALYTIC SERVICES**

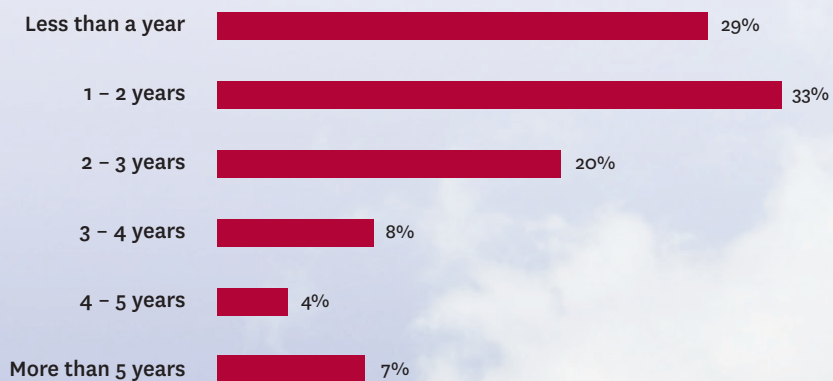
How the Cloud Looks from the Top: Achieving Competitive Advantage In the Age of Cloud Computing

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Length of Time Using Cloud Computing Figure 1

QUESTION: For how long has your company been using cloud computing?



Executive Summary

COMPANIES LARGE AND SMALL are moving quickly to adopt some form of cloud computing tools and services, recognizing a new technology that could reshape their competitive landscape.

In a new global survey of nearly 1,500 business and technology leaders conducted by Harvard Business Review Analytic Services, the majority — 85% — said their organizations will be using cloud tools moderately to extensively over the next three years. They cited the cloud’s ability to increase business speed and agility, lower costs, and enable new means of growth, innovation, and collaboration as the drivers for this fairly aggressive rate of adoption.

A small group of early adopters (only 7% of respondents have been using cloud computing for more than five years) (Figure 1) said cloud technology has already provided them with real business value and advantage, including faster time to market and speed to effectiveness, lower cost of operations, and the ability to acquire and integrate new operations more quickly and easily. These benefits are becoming more widely recognized; more than half of respondents (57%) believe that cloud will be a source of competitive advantage for early adopters, and 26% described their company’s posture toward cloud as enthusiastic.

But for others, the speed of adoption is slower because executives say they have yet to gain a full understanding of the benefits and risks of cloud computing (Figure 10), and they have concerns about security, business continuity and compliance issues (Figure 7). Fifty-nine percent of respondents said they are using limited or no cloud services today (Figure 2), and 36% described their company’s posture toward cloud as either cautious or resistant.

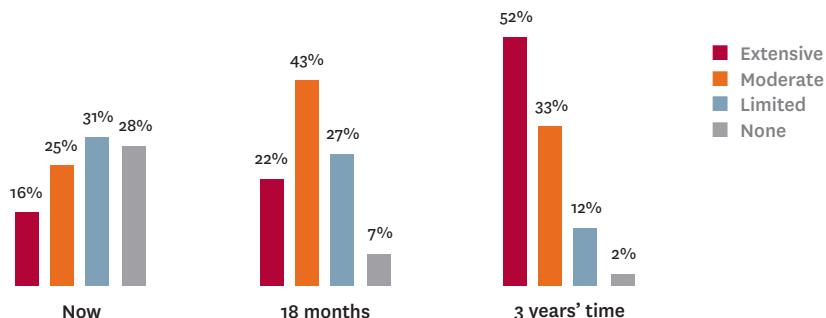
Clearly, the speed of migration will be influenced by circumstances. More evidence of cloud’s business benefits would accelerate adoption — as would better-informed management teams — while a high-profile security breach or major outage resulting in loss of business could inhibit expansion.

But there’s wide consensus that cloud technology has the potential to offer more flexible, agile, and usable means to solve business problems — and that it has a lower cost to implement and run. “In some cases, we’re talking orders of magnitude and millions of dollars a year,” said the CIO of a global electronics manufacturing services provider.

Current and Projected Use of Cloud Computing Figure 2

QUESTION 1: Please indicate the extent to which your company uses any form of cloud computing.

QUESTION 2: Please indicate the extent to which your company will be using cloud in 18 months and three years.



How the Cloud Looks from the Top: Achieving Competitive Advantage in the Age of Cloud Computing

FULL REPORT

CHANGING THE GAME: SPEED, FLEXIBILITY, COLLABORATION, AND INSIGHT

Cloud users agree: cloud equals speed. “Once we get our heads around how to manage cloud as a service-delivery engine, our ability to adopt and change will be as fast as we can write a PO for services we don’t have today,” said the CIO of a \$13.4 billion global manufacturing company.

Respondents rated increased business agility as the most valued benefit of cloud computing, with 44% scoring it five out of five (Figure 3) and an additional 34% scoring it four out of five.

Highly Valued Benefits Figure 3	<i>percentage saying “highly valued”</i>
Increased business agility	44%
Flexible capacity	41%
Faster adoption of new technology	36%
Lower fixed costs (shift from capex to opex)	33%
Lower up-front costs to develop/deploy IT systems	31%
Always on newest versions of software without IT updates/patches	26%

Speed translates to competitive advantage when it enables a company to capture or launch new business quickly. “Having a scalable infrastructure enables us to go out and acquire a new business more easily,” said the CIO of a rapidly growing midsize emergency medicine staffing services provider. “Today we just have to turn on additional licenses.”

Likewise, when a \$30 billion global design, manufacturing, and service company won a contract to take over 2,000 repair shops from a large OEM, executives had to rapidly deploy the service application they used in their own repair business. To deploy on-premise infrastructure for all the shops would have required them to spend months requisitioning and deploying servers, plus millions of dollars to buy the equipment and train people to use those servers. Instead, they adapted the application for the cloud using a platform-as-a-service offering and were able to roll it out almost instantly. “That’s a real competitive advantage when we look at going head to head in the marketplace with end customers,” said the CIO. “It’s about speed and ubiquitous access to the tool, plus the cost savings.”

Cloud also lets organizations test an idea or an approach more easily and at lower cost, according to 64% of respondents (Figure 4). “If it doesn’t fly, we shut it down and throw it away,” said a senior technologist at a Global 50 company. If the idea is viable, it’s easy to scale up capacity and investments in direct proportion to the business opportunity and need — and to just as easily scale it back down.

“It’s about speed and ubiquitous access to the tool, plus the cost savings.”

Advantage of the Cloud <small>Figure 4</small>	<i>percentage agreeing</i>
Lets us experiment more easily and at low cost	64%
Enables deeper collaboration with business partners	61%
Frees up IT resources to work on more strategic things	60%
Is a source of competitive advantage for early adopters	57%
Lowers the cost of doing business	55%
Lowers overall IT costs	55%

Leaders at large organizations are particularly excited about cloud’s ability to provide increased visibility across divisions as well as up and down the value chain. “Cloud gives us the ability to start penetrating silos,” said a business strategist at a large transportation company, calling it “information as a service.” “It enables collaborative management at multiple levels [by providing] a persistent layered view of critical data” for different purposes: operational, support and administrative, and an abstracted layer for management.

Cloud’s ability to penetrate silos applies just as well outside the company walls. Sixty-one percent of respondents agreed that cloud makes it easier to quickly share information and collaborate with customers and suppliers quickly. “It will finally enable the age-old control tower concept that no one’s been able to do really well before,” said the CIO of the \$30 billion manufacturing company, who has been using cloud for over five years. “It solves a lot of the technical problems and lets you focus on the higher-level issues. We’ll be able to look downstream to retail or even post-sale repair data and all the way back upstream to second- and third-tier suppliers in real time.” This will improve the company’s forecasting as well as supply chain and inventory management.

CLOUD USAGE TODAY

Adoption of cloud computing is widespread among organizations — 75% reported that they use some form of cloud computing (Figure 2). However, use of the cloud inside most organizations is still limited: 62% have been using cloud computing for less than two years, and only 16% describe their use as extensive.

Respondents’ use of cloud was closely divided among exclusively public, exclusively private and hybrid use (Figure 5). Exclusive users of public cloud services were more likely to be in smaller companies (fewer than 500 employees) and in professional services and B2B services. Companies with only private cloud implementations included those in the health care industry and those taking a more cautious approach. Hybrid users were the most sophisticated, with more than three years’ experience and extensive use of cloud.

Types of Cloud Usage	percentage agreeing
Public Computing resources are externally hosted by a third-party service provider, shared with other organizations, provisioned dynamically and billed based on use	29%
Private Cloud environment is not shared with other organizations	37%
Hybrid Operates in both public and private cloud environments	34%

The main use of private clouds, according to users of both private and hybrid clouds, is to create a more flexible, scalable infrastructure for internal IT operations (76%), followed by the ability to connect more easily and in more significant ways with external partners, suppliers, and customers (51%). Forty-seven percent seek to create advantage for their own organization in an industry ecosystem they control (Figure 6).

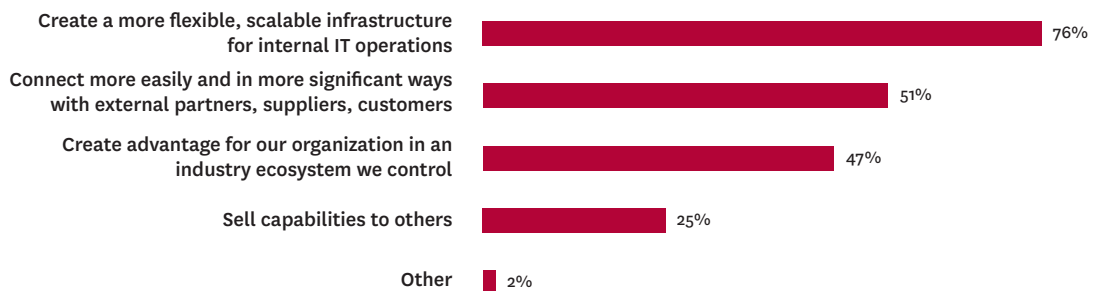
The CIO of a global construction company believes that the only real difference between private and public clouds is physical location and whose balance sheet the asset sits on. “As long as you’re building on the same principles and technology, it doesn’t matter if it’s private or public,” he said. “It comes down to comfort levels and policies that certain information has to sit on assets owned by us.”

This sentiment is atypical, however, attributable to the fact that this CIO is a sophisticated early adopter. Most executives are still quite concerned about the perceived barriers and risks of cloud (Figure 7), with data security (60%), business continuity (46%), and legal liability and compliance issues (33%) topping the list. Cloud users are waiting for legal precedent to be set through test cases; in the meantime, some companies are taking out cyber-liability policies to offset costs in the event of data loss due to a failure or security breach, as few providers offer any such guarantees.

Executives interviewed for this report said that bandwidth constraints in some parts of the world already limit what’s possible, making it harder to realize the vision of the “fully distributed intelligent enterprise.”

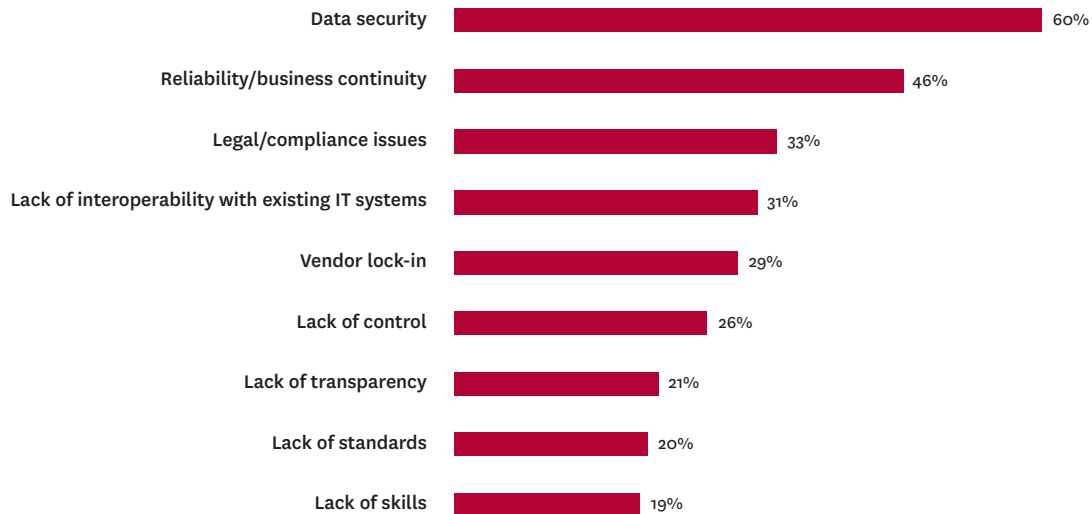
How Companies Will Use Private Cloud Figure 6

QUESTION: If you have developed your own private cloud, to what use will you put it?



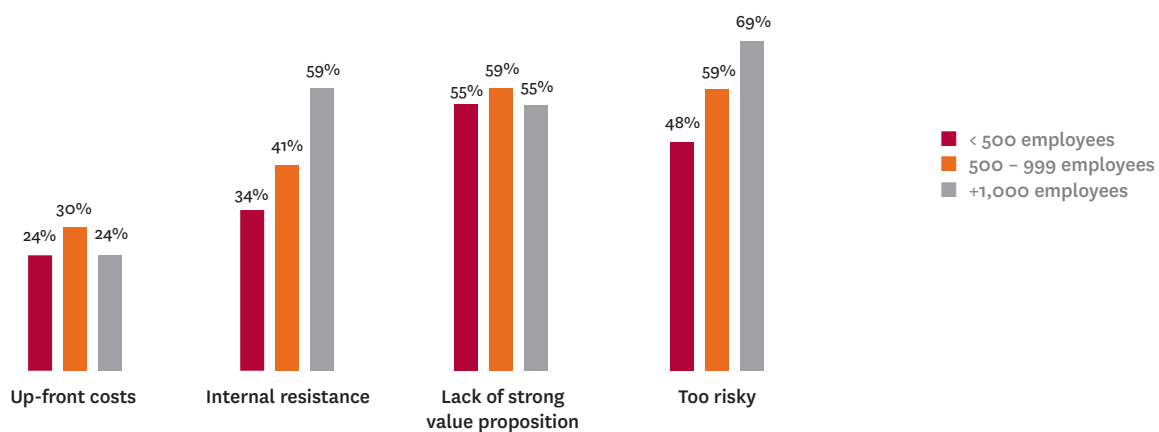
Significant Concerns Associated with Cloud Computing Figure 7

QUESTION: Please rate the level of concern in your organization over these perceived barriers or risks of cloud computing.



Reasons for Nonuse of Cloud Computing Figure 8

QUESTION: How would you rate the following reasons why your organization is not currently using cloud computing?



Taken as a whole, senior management attitudes toward cloud were almost equally split between the benefits outweighing the risks (37%), risks outweighing benefits (30%), and benefits and risks being equal (33%). But experience breeds confidence: only 4% of senior managers in companies with more than five years' experience with cloud believe that the risks outweigh the benefits. However, respondents agreed that any major high-profile breach or failure — “a CNN moment,” as one put it — would have a definite chilling effect.

Similarly, executives at companies that aren't doing any cloud computing said the main reason they hadn't yet stepped in was that it was considered too risky at this time (56% of all nonusers agreed with this statement) along with a lack of a strong, credible value proposition (55% of all nonusers). Answers to this question varied significantly based on company size (Figure 8).

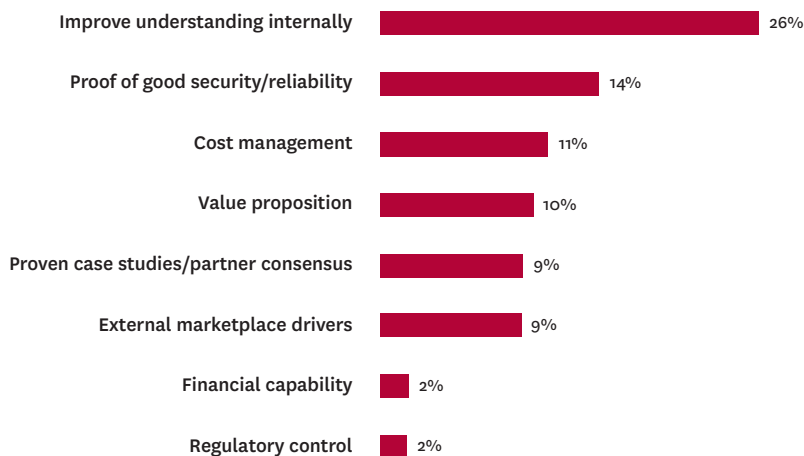
FOCUS FOR THE FUTURE

The use of cloud is expected to increase fairly dramatically over the next three years. Respondents predicted that usage would grow from just 16% today to 52% in three years, and only 14% indicated limited to no use of cloud in three years (Figure 2).

Topping the list of accelerants — particularly among companies not yet using any cloud — was an improved understanding internally about the real benefits and risks (Figure 9). Case studies, examples, benchmarks, and evidence of value are all in demand, but such data is scarce. Only 20% of survey respondents were very confident that they have the information they need to make sound decisions when it comes to cloud (Figure 10).

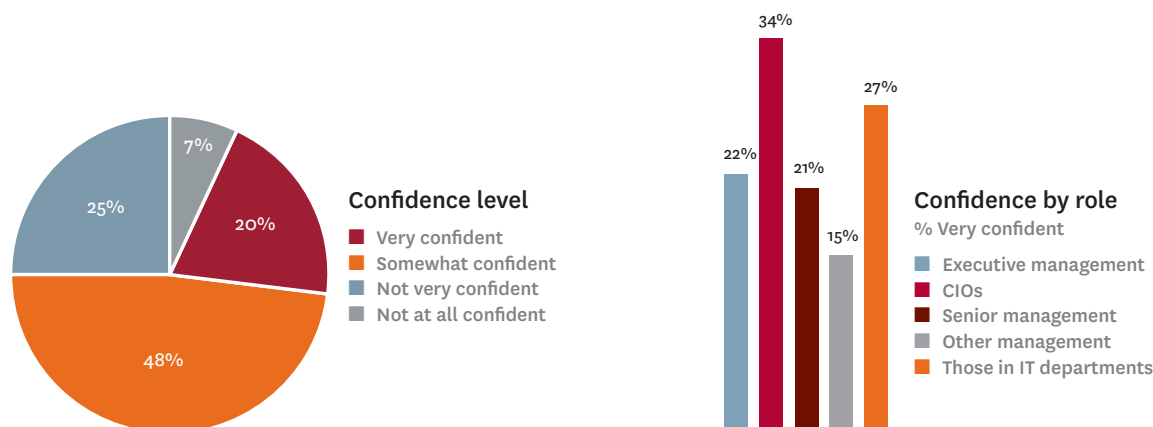
Factors That Might Accelerate a Move to Cloud Figure 9

QUESTION: What, if anything, would cause you to accelerate your move to the cloud?



Confidence in Information to Make Cloud Decisions Figure 10

QUESTION: How confident are you that you have the right information to make sound decisions when it comes to cloud computing?



CIOs are significantly more confident about the cloud, at 34%, and clearly have a role to play in educating their companies' executive and senior management. The gap between the information that executives need to make sound decisions and what they actually know is wide (Figure 11).

On the other hand, experts say, there's a risk in depending too much on the experience of others because "a lot of people are doing it wrong. You just have to get in there and try it." Start with something you're not doing yet or can't do today rather than moving something you're already doing, one CIO said. "That's where infinite capacity is appealing."

Moving to cloud for more than isolated services will be easier for companies with mature IT capabilities — those who understand enterprise architecture and have already built a services-oriented foundation, experts say.

Even for these organizations, however, the path and timeline aren't clear. "No one fully understands this yet," said the CIO of a business school. For one thing, "there's no such thing as a standard offering. One vendor charges monthly data transfer fees; another doesn't. It's hard to compare prices." It took 10 to 15 metrics to come up with equivalent baselines for servers that the university had put up in its own private cloud. "Once you understand the economics, then you can start to look at support, their technology, service, and SLAs."

For many CIOs, there is much about cloud that is really different from traditional approaches to IT. As the CIO at a large oil company put it, the role of IT shifts from "construct and operate" to "acquire and deploy." "You spend less time negotiating contracts and more time picking from menus. And some of the smaller cloud providers don't understand enterprise needs. It's important to read the contract and make sure you have an exit strategy," he said.

LESSONS FROM AN EARLY ADOPTER

Most organizations have been using cloud computing on a limited basis for less than two years. One early adopter shows just how strategic the cloud can be.

Not many companies were moving aggressively into the cloud back in 2005. That's when one global construction company began benchmarking its IT operations against leading Internet-based businesses like Amazon, Google, YouTube, and Salesforce.com, and then replacing its data centers and rebuilding its network in a cloud model. Its goal has been to enable three areas of value: efficiency, effectiveness, and expansion.

Efficiency: For this company, efficiency means having not only the right cost level but the right mix of variable and fixed costs. "What it comes down to is being able to balance costs against what the business requires," said the CIO. Cloud's consumption-based pricing enables that.

Effectiveness: For a large global business, effectiveness means being able to have full-fledged collaboration — voice, video, and data — with anyone, anywhere, at any time. And that includes not just how people interact, but how applications and everything works together, according to the CIO. "There's no more natural way to do this than in the cloud instead of in a proprietary environment."

Expansion: Cloud enables corporate IT to shift its focus from building, managing, and maintaining large application suites to enhancing the value of the information in its custody. "Eighty percent of the people who interact with our information only read it — they never add, edit, or delete anything," said the CIO. The environment this company has created will let information flow through its entire value chain — from suppliers two or three steps back all the way forward to the people who are maintaining a piece of equipment in the final plant. "Even if the information gets created before us, we are the custodian for someone else after us who will actually benefit from it." This ability to easily share relevant information will be a key source of customer value, company executives believe.

To deliver that information in a more effective and efficient manner, IT staff are writing "very small apps that have a very big impact." The CIO likens this to the way consumer applications are written for the iPhone, iPad, or Android devices in response to market opportunities. This company is creating its own API stores so small apps can be developed literally in days at relatively low cost with a built-in security model. "It's impossible to do this in any other way than cloud."

If competitive advantage is all about speed (speed to market, speed of execution, speed of operations), then speed is all about simplicity, according to the CIO. "We say speed equals innovation times simplicity, and 80% of the value comes from simplicity."

The biggest challenges to cloud adoption will not be bandwidth or even security issues, he believes, but rather a reluctance to try something new. "To do what we did was 20% technology and 80% willingness to change."

“Speed equals innovation times simplicity, and 80% of the value comes from simplicity.”

Trying to operate in the old way — for example, hiring a large integrator to run your implementation — misses the point (and the cost benefits) of cloud, experienced users believe. One company was quoted \$20 million to move to a software-as-a-service solution for HR because they had brought in a third party to do it for them, when another very large company had done the whole thing for less than a quarter of that. “A lot of people just don’t get it yet.”

Finally, there’s the issue of coordination and decision making. “It’s become so easy and low cost to move things to the cloud,” said one adviser. “More emphasis has to go into governance, visibility, and oversight to make sure the company is not putting its eggs in the wrong baskets — there are a lot of fly-by-night operations out there.”

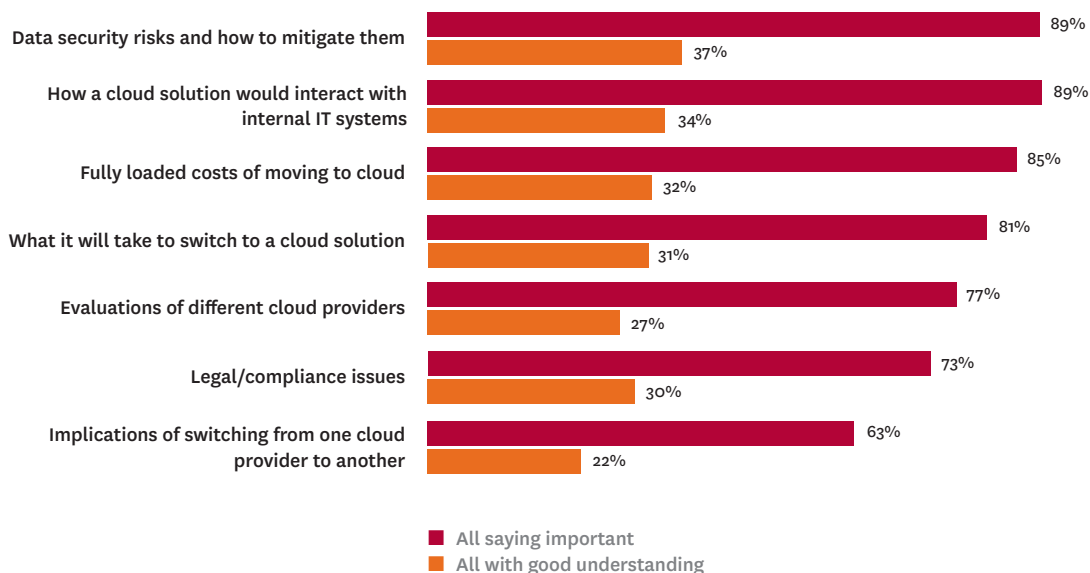
One of the hot applications of cloud today is “big data” analytics — being able to analyze massive data sets in real time, with none of the overhead costs — allowing internal staff to focus on presentation and making the data useful.

And while some CIOs argue that large core systems like ERP are sacrosanct and will never move into the cloud, others disagree. “I would love to see true, full standardization in the cloud for big enterprise systems,” said a senior technologist. “I would go to it in a heartbeat, even if it took us five years.”

Information Gaps Figure 11

QUESTION 1: Please rate the importance of having good information on the following in your decision to move to a cloud service.

QUESTION 2: Please rate the current level of understanding in your organization about the following.



CONCLUSION: CLOUD COMPUTING'S NEXT FRONTIER

With so many executives seeing the promise of the cloud — in increased business agility, flexible capacity, and the ability to experiment and adopt new technology faster at a lower cost — the prospects for cloud adoption look bright. Three-quarters of those surveyed said their organization currently uses some form of cloud computing, while over half of those companies not currently using cloud technology said they will be under way in the next 18 months.

Early adopters already report gains in innovation and productivity while lowering costs and believe they've gained a competitive advantage.

But there is another group of organizations that has yet to fully capitalize on cloud capabilities. Executives in many of these companies believe they can gain considerable advantage from cloud computing, but they are still looking for answers to questions about security, reliability, and implementation costs. “We already have information overload — we have too much to wade through to get a decision with a non-tech-savvy leadership team,” said one executive.

This is where CIOs, who reported much greater confidence in cloud computing than other executives, will play a crucial role — not only in educating their business colleagues but in “re-visioning” the role of IT in cloud computing. The future will require new skills, closer relationships with business partners and cloud providers, and a much greater velocity of execution.

“There's a lot that has to change,” said one CIO, predicting that “it will be a more interesting era for IT.”

METHODOLOGY AND PARTICIPANT PROFILE

Harvard Business Review Analytic Services completed research with 1,493 individuals who were involved in making technology decisions for their organizations. Respondents were drawn primarily from the list of *Harvard Business Review* magazine and e-mail newsletter subscribers. In addition, 16 in-depth interviews were conducted by telephone with CIOs, business leaders, and cloud experts.

Participant Profile

Involvement in making technology decisions:

54% of respondents were very involved in making technology decisions (which may or may not include cloud computing) for their organizations.

Seniority:

52% of all respondents were in executive or senior management positions. A further 10% were CIOs.

Length of time in workforce:

Half (53%) had been in the workforce for over 20 years.

Function:

21% of respondents were in an IT role; a further one-quarter were in general management.

Key industry sectors:

17% of respondents were in the IT sector; other industries included professional services (12%); financial, manufacturing, and government/nonprofit each represented 10% of the respondent base.

Size of organization:

Average annual sales for 2010 for respondent companies were \$1.3 billion; average company size was 3,280 employees.

Region:

Over half of responding organizations were based in North America (52%), with almost one-third in EMEA (29%); 15% were based in Asia.

Service providers:

30% of respondents worked in organizations that provide cloud computing solutions or cloud consulting services.

CLOUD DEFINITION

For the purposes of this study, the following definition was provided to participants:

Cloud computing enables access through the Internet to a shared pool of computing resources (hardware, software, etc.) that can be tapped on demand and configured and scaled up or down as needed. There are three main categories of cloud:

Software as a Service (SaaS), in which users “rent” access to software application functionality (e.g., CRM, e-mail) over the Internet

Platform as a Service (PaaS), in which users develop and/or run their own applications in a cloud platform environment, with the provider managing the operating system, storage, hardware, and networking

Infrastructure as a Service (IaaS), in which users run all their own systems, including operating systems, etc., on a cloud provider’s infrastructure

Sponsor's Perspective



Information technology is in the early stages of a dramatic shift from client/server architecture to cloud computing, a shift that promises not just cheaper computing, but also faster, easier, more flexible, and more effective computing. Many things that were simply impractical are suddenly within reach, opening up a new dimension of possibilities — enabling businesses, for example, to enter new markets and seize new technical or strategic opportunities. This potential for cloud computing to redefine “the art of the possible” is creating real excitement among corporate technology leaders. Analyst firm Gartner estimates that by 2014, the worldwide market for cloud services will total \$148 billion.* Gartner also forecasts that enterprises will spend \$112 billion cumulatively on software as a service (SaaS), platform as a service (PaaS), and infrastructure as a service (IaaS) combined over the next five years.

But, as with all seismic shifts in the technology landscape, the excitement is tempered by a healthy dose of caution. Industry leaders and observers alike are asking all the right questions about security and compliance, about the smartest migration path, about business value. Like every pivotal moment in our industry’s history, this one will be more process than event, a journey rather than a destination. Because every business has its own unique starting point based on today’s realities, every business’s journey will be unique. That said, every journey to the cloud should begin with business requirements rather than technical considerations that may artificially limit the possibilities. How will the business benefit from lower costs and increased efficiencies? What new scenarios will make the business more responsive to customers, more threatening to competitors, or more valuable to shareholders? Only when the business goals are clear can the technology fulfill its promise.

A trusted partner to businesses for more than 25 years, Microsoft offers the most comprehensive approach of any cloud-computing vendor. We offer an extensive set of finished services so businesses can consume applications (e.g., productivity, collaboration, business intelligence, CRM) from the cloud. We offer infrastructure as a service so businesses can move existing applications and workloads to the cloud. And we provide the industry’s most robust platform for developers to create new applications optimized for the cloud. All of these options are available in combination with each other, in a shared or dedicated environment, on your premises or hosted by a third party. And they are bound together by a common set of tools that make managing private, public, or hybrid cloud scenarios easy and familiar. Most importantly, our comprehensive approach ensures that your investments today (in both infrastructure and skills) will remain relevant as your unique journey unfolds.

Microsoft is pleased to sponsor this white paper from *Harvard Business Review* in the interest of furthering the industry dialogue about cloud computing — including dealing with the tough questions. Nobody has all the answers... the road ahead holds twists and turns that no one can fully anticipate. But our clear vision and comprehensive approach are already helping businesses around the world innovate, seize new opportunities, and imagine new scenarios that will move their organizations forward in unprecedented ways.

*Gartner, “Forecast: Public Cloud Services, Worldwide and Regions, Industry Sectors, 2009-2014,” November 2010.



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