Six questions every health industry executive should ask about cloud computing

Health industry executives need to evaluate what cloud computing can do for their organizations. Asking the right questions is the place to start.

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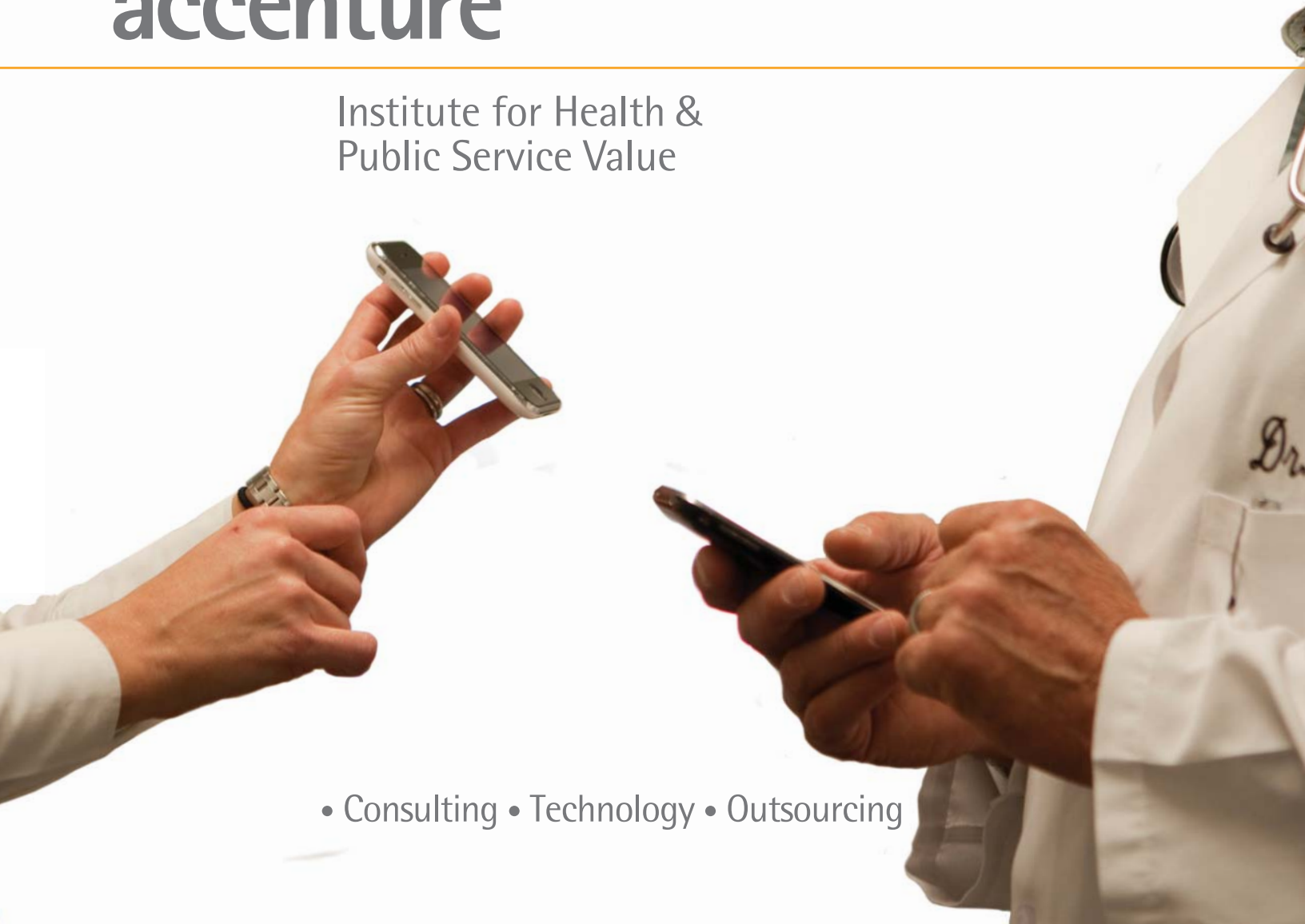

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No leader today in business or government can afford to ignore cloud computing.[1] Many global organizations—including Citigroup and Starbucks—are already using it to analyze data, provide applications to employees and run special projects.[2] Media giants are reported to be working on a cloud-like service that will enable content to be delivered dynamically in multiple formats and on a variety of devices.[3] And more cloud services will soon be available, as established IT and telecom providers such as Microsoft, IBM, Accenture, Fujitsu, KDDI, China Mobile and SingTel join cloud pioneers like Google, Amazon and Salesforce.com.[4]

Many aspects of the health sector are well-suited to the flexibility and collaboration enabled by cloud services. These include the industry's vast and fragmented ecosystem, with participants ranging from patients and insurance companies to hospitals, physicians and testing laboratories all with a mission-critical need to share health records quickly and accurately. However, this sharing must also be carried out securely and confidentially. Concerns over these issues represent the stumbling block that has hampered adoption of cloud technologies to date. Given the sensitivities around data security and privacy and the fact that privacy and consent policies vary in every state, region, and country, it seems likely that the first wave of cloud implementations in the health industry may consist largely of private clouds set up and run by specific countries and/or groups of providers. Once these are proven, they may then move into public infrastructure, enabling increasing levels of collaboration and integration with other clouds.

This prospect is creating significant optimism about the long-term potential of cloud computing in the health sector. However, alongside the optimism, cloud computing also raises some difficult questions, quite apart from the overarching concerns over the security agenda. While cloud can undoubtedly bring significant benefits, the technology's disruptive and pervasive impact makes it hard to evaluate its longer-term costs and risks. Furthermore, the significance and effects of the cloud will differ widely between different industries and even different companies in the same industry. Faced with such uncertainty, it is all too easy for leaders to succumb to "analysis paralysis" or leave all the decisions to the IT department. But cloud computing is too important for such a hands-off approach.

To help health industry decision-makers make the right choices about cloud computing, Accenture has identified six key questions that we think they should ask about this still-new paradigm. By focusing on these questions, executives can focus their attention on the right set of key issues, and start to identify the real opportunities and risks for their own organization.

Healthcare is a highly complex and fragmented industry. It is unique in that it must support a widespread, diverse professional user population (i.e., clinicians) with patients in life-critical situations. The industry is currently facing growing economic and regulatory pressures that make its IT infrastructure ripe for radical change. In combination, these two factors suggest that organizations in the health industry should take a closer look at the potential benefits of cloud computing (see definition box).

The top priorities of the health industry include improving the quality of patient care, reducing cost, increasing access, and ensuring data privacy and security. Widespread adoption of cloud computing would have significant implications for each of these strategic areas.

Improving care quality

This requirement is a potential driver for cloud computing adoption, especially given the billions of dollars in federal incentives in the US for quality outcomes and the "meaningful use" agenda, which aims to expand the use of electronic health records systems as well as provide the basis for exchange across and between providers, regardless of which information platforms they are using. Electronic health records (EHRs) are expected to be in widespread use by 2014.

In addition, consumer-oriented cloud applications have the potential to improve healthcare communications and patients' ability to manage their own diseases and make healthy life-style choices. The cloud platform also lends itself well to new models requiring ubiquitous access from multiple providers to a single patient, such as a Patient Centered Medical Home (PCMH) model or Accountable Care Organization (ACO).

Reducing costs

The potential to reduce costs throughout the health industry ecosystem is a key rationale for the adoption of cloud computing. This benefit would extend to all healthcare organizations, regardless of size and area of specialization. In making IT investment decisions, health organizations will take account of cost savings and returns on investment to optimize current and future spending. With many of the new Health Information Exchange (HIE) models such as PCMH and ACO, the infrastructure and design are in place but usage has yet to take off. Until greater adoption occurs among providers in a state or region, a limited cloud infrastructure with ability to quickly scale may represent the ideal platform.

What is "cloud computing?"

Cloud computing is an emerging computing paradigm that has the potential to change how business works. Accenture defines cloud computing as "the dynamic provisioning of IT capabilities (hardware, software or services) from third parties over a network." A variety of factors are converging to make cloud **c**omputing eminently possible—and its promise of rapid, pay-as-you-go scalability is very attractive to many CIOs under pressure to do more with less. In fact, Accenture sees cloud computing as an important step forward in the continuing industrialization of IT—and thus capable of ultimately playing a role in enabling high performance.

Increasing access

In today's health system, whether or not someone can receive the right care—as well as what kind of care one might receive—depends heavily on the physical location where that person lives. As more health data moves into the cloud and telehealth technologies become more widely adopted, all parties, including patients themselves, will be able to access health information and services from anywhere using any device. The result will be better access to health care and data, especially in remote and emerging areas.

Ensuring data security

As we have already pointed out, risks around data privacy, security and safety, and state-specific policy rules are among the top concerns raised about the adoption of cloud computing. As a result, these issues currently represent the greatest deterrent to embracing cloud computing. Provisions such as the US Federal (the US Department of Health and Human Service's Health Insurance Portability and Accountability Act, or HIPAA), European Union and other national or local data protection regulations must be met. As well, the US Patriot Act raises concerns over on-shoring of data from overseas.

However, the data security issue could ultimately play in favor of cloud computing. By centralizing and standardizing the handling of patient data across the health ecosystem, adoption of the cloud could enable stronger security and authentication to be imposed by software as a service (SaaS) providers, thereby actually improving the protection and integrity of data. And, in terms of patient privacy, existing online personal health record applications such as Microsoft HealthVault and Google Health are specifically designed to offer a level of security that is appropriate to the industry's requirements.

A technology whose time has come for health organizations

While these are still early days for the adoption of cloud computing in health, and efforts to alleviate concerns over security are continuing, there are already clear signs that the industry is starting to appreciate the benefits. While healthcare companies are by nature a relatively conservative group of businesses, recent research shows that they are increasingly turning to cloud services to boost their efficiency and effectiveness.

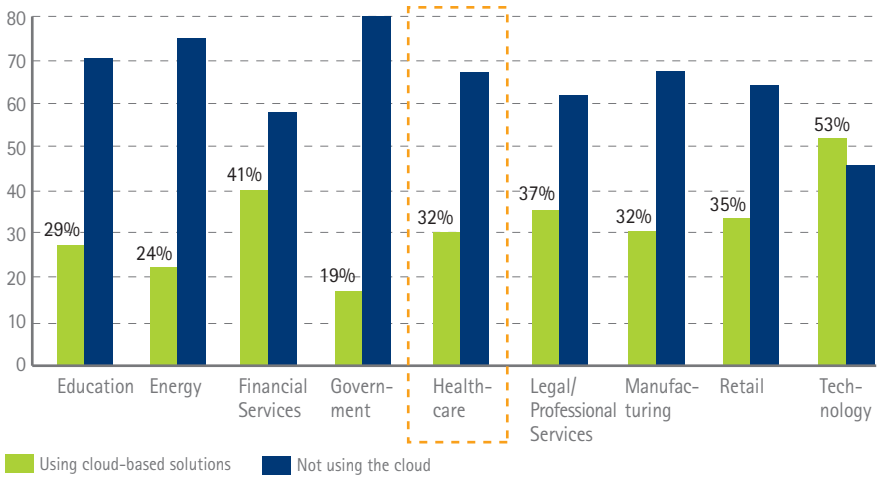
As Figure 1 shows, a study released in early 2010 found that almost a third of health industry respondents are already using cloud applications, an adoption rate that compares well with many other sectors.

It is also clear that the early adopters' experience with cloud computing has been sufficiently positive to assuage health companies' fears and encourage rising take-up in the future. The same survey found that almost three-quarters of health industry respondents already using cloud-based services are planning to move more applications to the cloud (see Figure 2).

These findings suggest that a further driver for cloud adoption is emerging in the health industry. As more participants in the health ecosystem move to cloud computing, those that hang back may find themselves at a competitive disadvantage in terms of cost and effectiveness, as well as being less able to collaborate seamlessly with other players than the cloud-enabled companies. This prospect indicates that health companies should not only consider cloud computing, but should do so as a matter of strategic urgency.

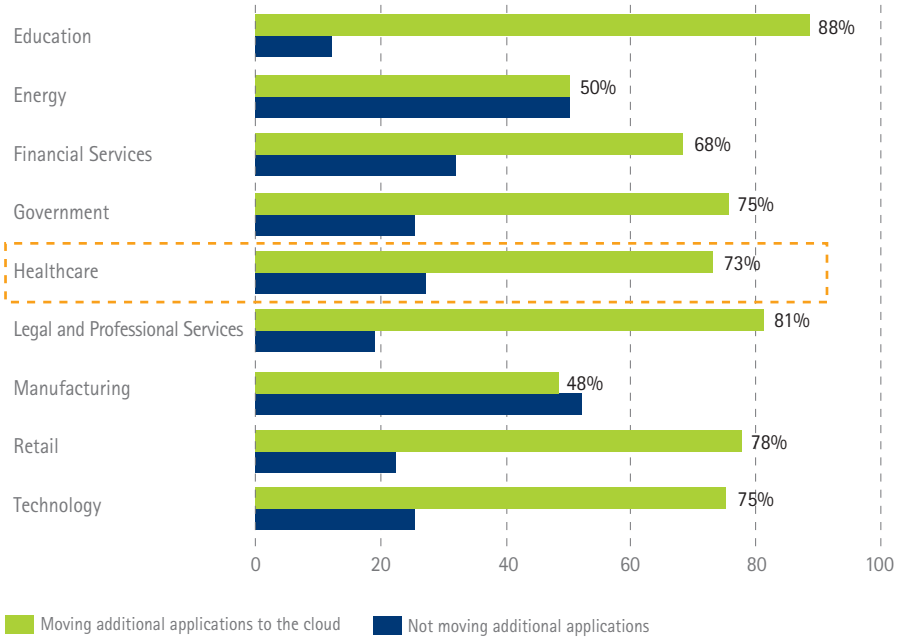
We will now go on to explore the six key questions that we believe every health industry executive should ask when evaluating the potential adoption of cloud computing.

Figure 1. 32% of healthcare respondents are using cloud applications



Source: Mimecast, Cloud Adoption Survey Results, February 4, 2010[5]

Figure 2. 73% of healthcare respondents plan to move more applications to the cloud



Source: Mimecast, Cloud Adoption Survey Results, February 4, 2010[5]

Health and cloud computing: mapping industry needs to technology capabilities

There are several reasons why the health industry's unique blend of requirements is so suited to cloud computing solutions:

- It can lead to easier update and higher quality patient data—a feature especially important in health care, where fragmented, redundant, and inconsistent data is rampant today.

- SaaS-based electronic medical record (EMR) solutions are a natural fit for small physician practices to which most physicians belong because of their affordability, ease of use, and small requirement for ongoing technical support.

- The exoskeleton nature of the cloud makes it relatively easy to inter-connect disparate systems from different health organizations, and provide an elastic infrastructure that can start inexpensively and quickly scale as adoption increases. Thus, it provide an ideal architectural alternative for Health Information Exchanges (HIEs). There are promising advances across a broad spectrum of patient-facing and telemedicine/telehealth applications. There is also growing attention on providing direct, continuous engagement between patients and providers through "in the cloud" relationships that include advanced continuous home and portable monitoring.

- Cloud computing-based health applications such as Microsoft HealthVault and Google Health can help create a new market of consumer-oriented healthcare applications, enabling better consumer lifestyle choices and more active consumer participation in choosing a course of treatment for serious health problems.

Sources: Gartner, Factiva [from Accenture 'Cloud Computing in Healthcare' deck, date Feb 19 2010, slide 3]

1. What is cloud computing, and how does it work?

At its most basic level, cloud computing allows all participants in the health industry ecosystem—from patients to employees to IT staff—wherever they are, to obtain computing capabilities through the Internet. At the other end of the Internet connection are computing "clouds," which are essentially supersized data centers containing tens of thousands of servers hosting web applications. Cloud services ranging from raw computing capacity to complete business processes can be purchased through web interfaces and turned on and off as they are needed.

This structure means the characteristics of cloud services include:

- Little or no capital investment
- Variable pricing based on consumption: buyers pay by the drink
- Rapid acquisition and deployment of systems and applications
- Lower ongoing operating costs
- Improved data sharing among different organizations

For businesspeople, cloud computing can seem almost too good to be true: plenty of computing power to tap into, and no expensive IT infrastructure to buy or maintain. For once, experience shows that the truth can match the hype, provided the cloud is adopted and managed properly. Cloud computing lets organizations bypass the expense and bother of buying, installing, operating, maintaining and upgrading the networks and computers found in data centers. Instead of licensing software, users tap into a service when it's needed for as long as it's needed. All that is required is a broadband Internet connection, and a mobile device or personal computer with a browser. As with most utilities, organizations pay by the kind and amount of services they use, plus any additional fees. (Some cloud services such as social networks and Web mail are available at no cost, but these are intended for individuals rather than organizations.)

The absence of a data center on-site doesn't mean cloud computing is not real. Here's how it works. The clouds, the remote data centers, are designed so that processing power can be added simply by attaching more servers; everything is virtualized so that software can be run on any available server with excess capacity. And because everything is hosted in the cloud, users can run processes, build applications and do more without loading each and every tool onto their computers.

Pathwork Diagnostics: tapping into the computing power of the cloud

Pathwork Diagnostics, a molecular diagnostics company, develops high-value diagnostic tests to help oncologists diagnose hard-to-identify cancer tumors. Pathwork uses proprietary machine learning algorithms to analyze large libraries of tumor specimen profiles—a computation process that can take months using a mid-size high performance computing resource. So it opted for cloud computing.

"Our challenge was a perfect fit for cloud computing," says Ljubomir Buturovic, chief scientist at Sunnyvale, California-based Pathwork. "We needed access to more computing capacity than we could possibly maintain internally—but only at certain peak times. When we develop and deliver a product for clinical validation, we'll have weeks where we need access to almost unlimited capacity."

Source: 'Health Companies in the Cloud', CMIO Magazine; http://www.cmio.net/index.php?option=com_articles&view=article&id=16941:future-forecast-cloud-computing-brightens-healthcares-dark-skies&division=cmio

The basic technologies are well-established and can be duplicated by any organization. This makes it possible for organizations to build "private clouds," ring-fenced infrastructure that uses cloud computing technologies but is only shared by approved organizations. Major public clouds require additional technologies so they can support many millions of users around the world without becoming sluggish.[6]

As we have already pointed out, the sensitivities around data security and privacy make it likely that the first wave of cloud implementations in the health industry may consist largely of private clouds set up and run by specific countries and/or groups of organizations. Over time, as these initial forays into cloud computing prove their functionality and robustness, these solutions may move out into public infrastructure, enabling increasing levels of collaboration and integration with other clouds. In the long term, building and managing a secure and flexible infrastructure cloud using a combination of "private" and "public" services will be an important building block if health companies are to harness the enormous benefits that cloud computing can provide.

This definition barely scratches the surface of the technical complexities of cloud computing. But for health industry leaders, it highlights the crucial point: with cloud computing, the provision of IT power becomes someone else's problem.

2. What benefits can clouds bring to my organization?

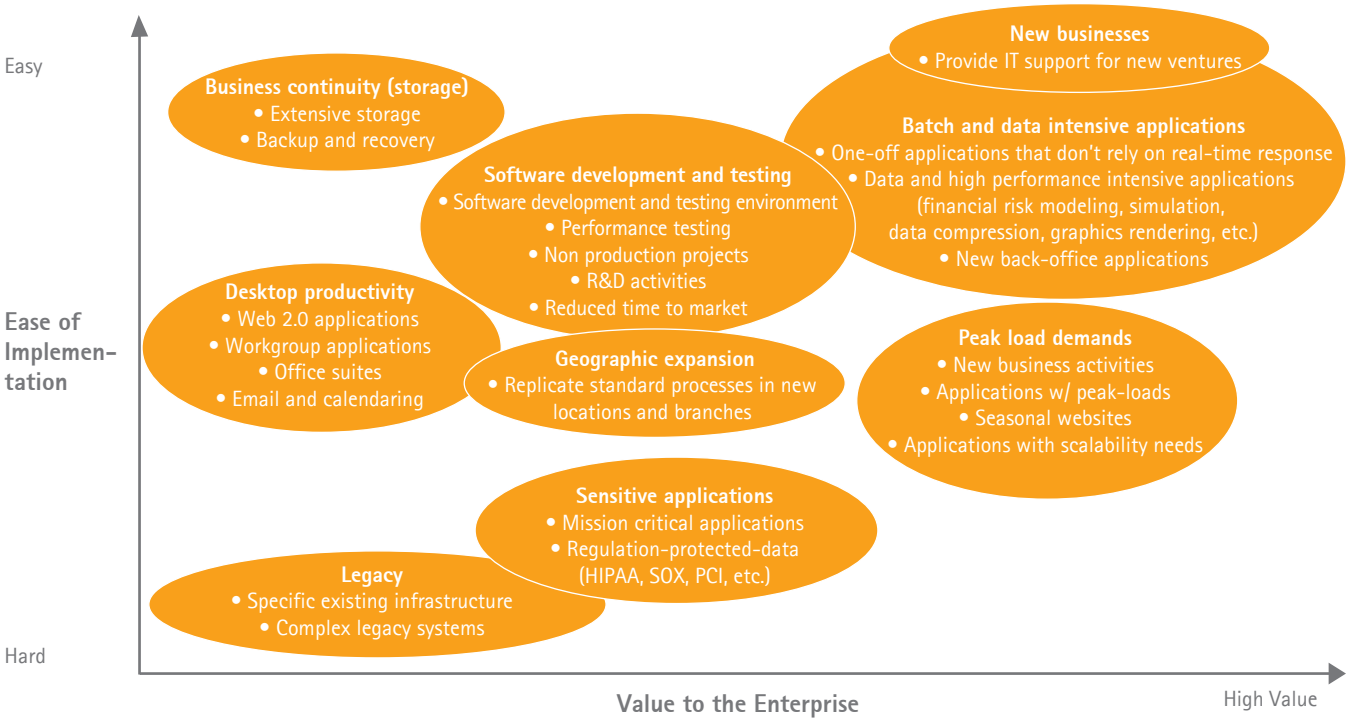
The three top benefits that cloud computing can potentially deliver to a health organization are improvements in cost, flexibility and speed to market.

Cost

The relatively low price of cloud services is a big part of their attractiveness. For example, a large pharmaceutical company is reported to have paid Amazon Web Services only US$89 to analyze data on a drug under development. To do the job themselves, its researchers would have had to buy 25 servers.[7] Add to that the savings from eliminating the cost of servers, software licenses, maintenance fees, data center space, electricity and IT labor—together with the benefits

Figure 3. Initial opportunities for using clouds

Accenture has identified many different possible uses for cloud computer



Source: Accenture Institute for High Performance

of replacing a large up-front capital expense with a low, variable, pay-for-use operating expense—and the financial appeal of cloud computing becomes even clearer.

These benefits are paramount in the case of non-profit organizations participating in US federal programs, such as Regional Extension Centers to assist small-practice physicians focusing on the medically underserved. Many of the tools, platforms and infrastructure necessary to support these service organizations, and even the small-practice physicians themselves, are not achievable in a short timeframe with significant up-front capital.

Flexibility

Clouds offer extraordinarily flexible resources too, and are scalable because of their underlying technical design. Clouds can be summoned quickly when needed, expand by assigning more servers to a job, and then shrink or disappear when no longer needed. This flexibility makes clouds ideally suited to sporadic, seasonal or temporary work, for finishing tasks at lightning speed and processing vast amounts of data, and for software development and testing projects—all of which are common requirements in the health industry. Clouds can also supplement conventional systems when demand for computing exceeds supply. And since they are an operational expense, cloud services can often bypass the capital-expense approval process, and thus be quicker to procure than conventional systems. In the pharmaceutical company's case, using clouds shaved three months off the IT budget and approval process. When translated to faster time to market, that represents US$1 billion in opportunity costs avoided.

Speed

Clouds, paradoxically, can both decentralize technical innovation and impose centralized control on IT resources. With the advent of the cloud, the barrier to entry for providing an innovative IT service has never been lower. Any programmer could create a software service using free or low-cost development tools and quickly make it available to all departments, potentially making each business unit and the organization as a whole much more agile and responsive. Clouds are also a fast and easy way for organizations to impose a standard set of applications or processes. They only need pay for a cloud service and then require employees to go online and use it. These benefits are attracting other sectors to adopt cloud-based approaches. In public services, cloud applications and mashups are becoming mainstream,

together with new publicly available data sets such as NYC BigApps and platforms such as iApps.

Industry advancements

On top of these three principal benefits, we believe that organizations in the health industry have unique opportunities to use cloud computing to deliver significant advances. In particular, a number of strong industry trends will drive adoption of—and subsequent benefits from—cloud computing in many new areas. These trends include:

1. Increasing use of Internet-based computing across the health industry and by patients, and the resulting explosion in health-related information, including digitized health data (MRI scans, Ultrasound images, positron emission tomography, endoscopy pictures, mammograms, and digital radiography) and user-generated content such as blogs, wikis, and online social networks.

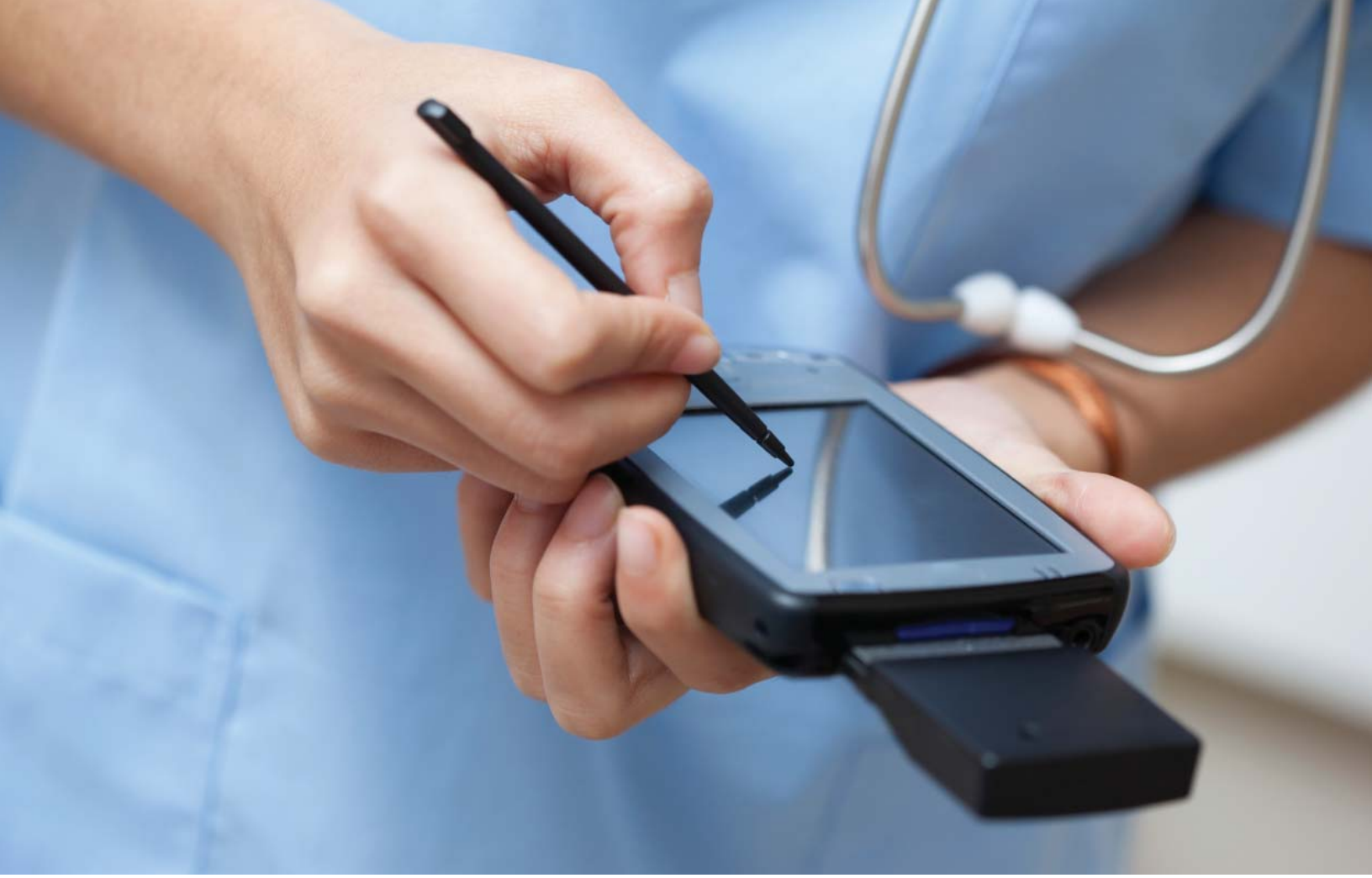
2. The push for greater data sharing and collaboration among health organizations, including innovations such as real-time biosurveillance by public health entities. To be efficient and deliver better patient outcomes, the health industry will need to foster closer and more inclusive teamwork between different organizations and patients, underpinned by better sharing of patient information.

3. Using data to assist clinical decision-making through evidenced-based approaches, such as drug interaction alerts and intervention reminders, and using large data sets across exchanges for comparative effectiveness research and population health reporting.

4. Patients' growing desire for information at anytime and anywhere, accessed through multiple mobile devices.

5. Increasing reliance on remote monitoring of health data entered by the patient, care taker or through automated medical equipment.

Cloud computing has the characteristics to support all these changes—Internet-based, flexible, pay-as-you-go, low capital investment, lower operating costs—while maximizing the benefits to health organizations and patients. As these characteristics suggest, a further important aspect of cloud computing is that its benefits are available to organizations of all sizes throughout the health ecosystem. This means it fosters collaboration and sharing not just between the biggest players, but in a way that is inclusive of non-profit and smaller specialist and niche organizations. Since an organization pays only for the services it uses, and no long-term contracts are



needed, cloud computing is affordable even for small physician practices, which represent around 49 percent of office-based physicians in the US.

Given that adoption of clouds in the industry is still at an embryonic stage, it is too early to make a completely accurate assessment of their potential for the health industry. Leaders should begin by looking for specific benefits for their own organization–ways to reduce costs, improve processes and more. They should also watch out for situations where clouds do not make sense. For example, migrating a complex legacy system to a cloud would require a costly redesign. Projects requiring a guaranteed response time should also be avoided, since guarantees are risky when data has to be accessed via the Internet.[8] Executives are likely to find the greatest benefit by envisioning new processes, applications, services and offerings that were previously too difficult or expensive for the organization to offer. The accompanying information panel summarizes some instances of new cloud-enabled service offerings.

3. Can I depend on clouds to save my organization money?

CIOs across many industries say they are finding real savings from cloud computing. Accenture estimates its own IT organization could save up to 50 percent of its hosting costs annually by transferring most of its applications to infrastructure clouds.[9] Bechtel's CIO benchmarked the company's internal data center and storage against those of Google, Amazon and Salesforce.com, concluding he could greatly reduce his per unit costs by creating an internal cloud.[10]

But health executives evaluating the potential savings from adopting cloud computing should not take most promises and projections of cloud savings at face value. The articles about companies that have saved money rarely explain how these savings were calculated. Some apparently rigorous analyses of cloud savings have been criticized as unrealistic.[11] Furthermore, while most organizations that use clouds say they are saving money as expected, not all are doing so. In one study of software-as-a-service users, only about half of the respondents reported a positive return on investment from SaaS, while a quarter found the cost was greater than they had budgeted.[12] And while Accenture's internal IT organization has moved several internal applications to the cloud, in a number of cases it has actively chosen not to do so, on the

Using the cloud to expand the service portfolio

There are several examples of health industry organizations already using cloud computing to support new services. These include:

- Many physicians in US are starting to use free or pay-as-you-go cloud-based, electronic health record services for recording and sharing patient information, such as Patient Fusion, Microsoft Health Vault and Google Health.

- The UK National Health Service has developed a secure, private cloud-based service for storing patient medical images for easy access across different parts of the organization.

- A US dental software company has developed a cloud-based application in response to the dental industry's need for a HIPAA-compliant method of sending, managing, and storing patients' electronic Protected Health Information (ePHI) among care providers. It runs on the public cloud and uses encrypted communication, access, and storage security measures.

- MedCommons, a health records services provider in the US, gives patients direct access to their medical information (via web browser) and allows an easy way to share this information with healthcare providers.

- The Office of the National Coordinator in the US itself has deployed a custom set of cloud tools based on salesforce.com to help the 20+ Regional Extension Center program awardees to manage provider outreach and assistance in their EHR implementation programs.

NY Presbyterian: bringing the benefits of the cloud to patients

Working together for over a year, NY Presbyterian (NYP) and Microsoft have co-developed a platform called MyNYP.org. MyNYP.org is a consumer-facing personal health record (PHR) solution for NYP customers that combines attributes of Microsoft's two leading healthcare solutions, consumer-facing HealthVault (which is a cloud-based platform) and provider-facing Amalga (which is not). In addition to using Amalga, Microsoft's Unified Intelligence System (UIS), to aggregate and present patient data to physicians, NYP is also using Amalga to aggregate and push such information into a customer's/patient's MyNYP.org PHR account. In doing so, NYP is enabling consumers to access and export all of their NYP clinical records into their personally controlled HealthVault (HV) account. This provides the consumer with the gold standard of clinical health data, combined with the portability and data management capabilities of HV. Based on the NYP experience, Microsoft now offers a product called HealthVault Community Connect.

Source: NYP; Drawn from: http://chilmarkresearch.com/2009/04/06/healthvault-ny-presbyterian-closing-the-loop-on-care/ (précised on page 1 of Accenture's "Health Companies in the Cloud" document)

grounds that the cost of hosting the system internally, either in an optimized U.S.-based data center or one of its Indian facilities, was less than that of an external cloud service.

Such instances suggest that health industry executives need to take a close look for themselves into the cost implications of cloud computing. Their investigations should include seeking rigorous ROI case studies based on actual cloud usage, rather than estimates of anticipated savings. Hardware, after all, is a relatively small component of data center costs. They also need to uncover the hidden management, transition, and usage costs that reveal themselves only when organizations start to work with the technology. Furthermore, they should examine the costs of using each kind of cloud service separately, since the pricing and cost involved in using different kinds of cloud services all vary. And they need to work with the finance department to develop a consistent and acceptable approach to measuring the costs and return from clouds. Only then can they reach a reliable estimate of the savings. In addition, the following factors will be critical to realizing the greatest possible benefits:

- Adopting common standards that make sharing easier
- Using standard, "fit-for-purpose" service levels as much as possible, depending on the requirements of each specific application
- Applying security and data privacy restrictions appropriately and, again, standardizing on the number of different levels as much as possible
- Overcoming any departmental "ownership" issues so as much work as possible can be moved to the cloud
- Taking care to maintain flexibility around procurement and avoid getting too tied into specific suppliers

4. How will clouds affect the way my organization operates in the future?

Companies that have built massive clouds are already transforming the nature of competition. Google's advertising-supported search engine and tools and Amazon's online retail operations are all made possible by the computing clouds created by those companies. Elsewhere, cloud-based consumer applications such as Facebook and iPhone applets are driving innovation in unpredictable ways. In the next few years, health industry organizations will also start to achieve similarly sweeping change by leveraging cloud computing. Here are some examples of the developments we are likely to see:

1. The development of a health industry information ecosystem, with electronic personal medical records at the heart, located in a secure, confidential cloud-based environment.

2. Increasing digitization of health information to provide a comprehensive patient medical record including medical notes, images, test results, and self-diagnostic information.

3. Increasing integration of mobile devices and cloud-based applications to support wellness programs such as exercise, diet, self-testing and remote health monitoring.

4. Increasing use of community applications (Facebook, Twitter, Youtube, PatientsLikeMe) to inform patients and to support communication and networking across health communities. The World Health Organization (WHO) used tools such as this to inform the world about Swine Flu.

5. A migration away from face-to-face to continuous interaction between patients and physicians, towards remote monitoring and information sharing supported by cloud computing applications.

6. The advent of cloud-based order entry applications to enable a physician to order services quickly and simply from health industry providers such as laboratories, hospitals and drug suppliers.

7. Medical decision support systems to assist physicians' clinical decision-making by providing evidence-based knowledge in the context of patient-specific data.

As with the benefits, it is still too early to gauge fully all the ways in which the cloud will change how the health industry will operate. Decision-makers will need to perform a thorough assessment to understand how clouds can help them. In particular, strategists must investigate what new services should be pursued using cloud computing, while CIOs must track the evolution of the technology and the market for cloud services, to ensure their organizations' strategic ambitions do not outrun the capabilities of the technology.

5. What about security, privacy and other risks around data?

Compared to the mainstream commercial sector, health industry leaders face significantly higher sensitivity around data security and privacy, reflecting the deeply personal nature of the information they hold and process. This means they need to scrutinize their decisions around cloud looking through a more powerful lens, taking account of a wide array of industry-specific factors:

1. Political and regulatory: it may not be acceptable to have patient health information held and processing performed outside the country.

2. Tough standards: given the extremely sensitive nature of patient health information and variations in state and regional regulations, concerns around security, data privacy and reliability may impose even tougher restrictions on how much flexibility is feasible when accessing, storing and processing data in the cloud.

3. Organizational issues: management will need to overcome any cultural barriers or resistance to sharing information, services and IT across health care organizations.

4. Procurement processes: designed to maintain fair competition between different suppliers, organizations' procurement policies may restrict their flexibility and leeway to use cloud services.

Various surveys have confirmed that security and data privacy remain prime concerns for cloud implementers in the health industry. The fear of their patient data being "out in the cloud" is the single greatest hurdle that health industry leaders must overcome to build trust and gain the benefits from cloud computing. CIOs are concerned that their data could be stolen by hackers, mixed with data from their cloud providers' other customers, or released by mistake. Any of these incidents would expose organizations to public embarrassment and lawsuits, as well as the time and expense of cleaning data and undoing other damage.[13]

Many health organizations today have very specific challenges in areas of security and data privacy. Their existing IT estates consist of highly fragmented landscapes of security and data privacy approaches and policies taken across different departments. This in turn carries a lot of risk and cost. Against this background, the move to cloud computing actually presents a positive opportunity to drive more consistency and automation in security and data privacy, thereby providing a catalyst for combining higher security with lower costs.

Our view is that organizations should adopt a very practical approach to security and data privacy in the cloud. Most health data can be tagged with different levels of sensitivity, from low level (published widely and no restrictions) to ultra-sensitive patient data. In the same way, organizations can design their cloud infrastructure to have appropriate levels of security built in, through a managed combination of both private and public clouds. So, for example, low-level data may well be suitable to go onto a public cloud infrastructure service with simple password access, whereas ultra-sensitive data may need to go onto dedicated secure servers housed in local data centers with strong authentication required for access. There will be several different levels of security between these two extremes. As we noted earlier in this paper, a key enabler for health companies to realize the full potential benefits of cloud computing may be to create and manage a secure and flexible hybrid infrastructure cloud combining both private and public services, with each function allocated to the appropriate type of service (see information panel).

6. What are my next steps?

Cloud computing is too important to the future of any organization to be left entirely to technologists. While the heavy lifting of the migration from conventional to cloud computing is likely to fall on the shoulders of the CIO, other senior executives should be closely involved and indeed will have important roles to play. To make sure an organization maximizes benefits and minimizes risks, executives must do the following:

Ask hard questions and demand data-based analyses regarding cost savings.

Don't assume automatic and substantive cost savings. Carry out an ROI analysis. Consider conversion and ongoing costs as well as savings. Don't be intimidated by the jargon. Experiment or pilot on low-hanging fruit such as workgroup applications, or on a non-mission critical, non-integrated application. Then be ready to scale once you've proven the benefits are worth it.

Establish a clear governance structure for cloud computing.

Many organizations have rules and structures in place that govern how IT decisions are shared between departmental leaders and IT executives. Use them (and if they don't exist, create them) to decide who inside and outside the IT organization should be engaged in decisions on cloud computing, and what decision-making rights and responsibilities they have.

Keep cloud efforts on track.

Make sure cloud computing receives the focused thinking, planning and follow-up it requires. Use the answers to these six questions to identify and address immediate business needs that lend themselves to cloud computing and longer-term opportunities for clouds, to develop a plan for using public and perhaps private clouds, and to gain the capabilities the plan requires. Make sure the organization understands and responds appropriately to the impact clouds are having on their operations.

Set the standards for success.

Provide the necessary oversight to the IT organization. Make sure that goals and deliverables are well understood, and that projects are well aligned

The hybrid approach: balancing security and ease of access

Adopting a cloud computing strategy that seamlessly integrates public and private cloud capabilities with legacy IT can enable a health organization to align its data security with the sensitivity of specific types of information, and well as bringing additional benefits and increasing the opportunities for success. This hybrid approach means an organization can meet the conflicting requirements for data privacy, security, lower costs, improved services and higher efficiency by:

- Avoiding the fragmentation and dilution of efforts that hinder efficiency, reliability, data privacy and security across departments.
- Enabling new integrated "patient-centric" processes that are gaining importance in health services.
- Sharing departmental peaks in data processing across the cloud to reduce overall capacity requirements and costs.
- Standardizing new and current services for multiple groups, saving development and maintenance costs and speeding provision time.
- Providing a platform that allows very quick development of new applications and services, ideal for short term needs.
- Facilitating real-time competition among service providers.

Managing the transition: the need for a balanced approach

To navigate a successful transition to a cloud computing environment, health companies will need to take a balanced approach that reflects their own specific characteristics and needs. For example, hospitals already have a significant investment in IT that they will need to manage, while small physician practices will probably be more focused on moving to lower and more flexible service costs. In health organizations of all kinds, one of the key challenges for the IT function throughout the transition and beyond will be deciding what to hold onto and what to let go. Large healthcare organizations are likely to pursue a blended and pragmatic approach for several years to come, supplying some hardware and software requirements themselves and purchasing others.

with business needs. Clarify how the value from cloud computing is to be determined: which quantitative and qualitative benefits are sought? And consider what else constitutes success besides value achieved and projects completed: skills developed, partnerships established, risks addressed.

Provide the necessary support.

Besides financial resources and technical talent, support other activities that will underpin the success of cloud initiatives. For example, organizations may benefit from a community of practice or a cloud program office to develop the skills and share the experiences of people engaged in cloud projects.

Buy cautiously, appraise frequently.

It's too early to predict who the major cloud providers will be in a few years, what capabilities they will deliver, when they will deliver them, and how well. So when selecting cloud providers, carefully consider whether they have the potential to be a desirable partner in the future. Even after they are chosen, evaluate your partners on their financial stability, as well as their ability to improve functionality and service levels, to integrate data across different technology platforms and cloud services, and to deliver on their promises.

It will take time for organizations to achieve the transition to cloud computing. Executives are still grappling with its risks and possibilities, and the cost of writing off current IT investments. Still, a transition to a hybrid of cloud and conventional computing is under way. The capabilities and potential savings from clouds are too great to ignore. In addition, software developers and venture capitalists will be drawn to this new market. The low development cost, short development cycle, and quick return on cloud services are irresistible. This means future IT advances and innovations are much more likely to be based on clouds than conventional computing. For health companies, the critical issue isn't whether cloud computing will become a fundamental technology in the next decade. It is how they will make money and generate benefits for patients from the capabilities it offers.

As we have stressed throughout his paper, cloud services will evolve over time. Managing the new cloud capabilities in tandem with all the existing legacy systems in a coherent and consistent way will be critical to realizing the benefits and managing the risks.

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References

1 "What the Enterprise Needs to Know About Cloud Computing," Accenture Technology Labs, October 2009; "Gartner Identifies the Top 10 Strategic Technologies for 2010," Gartner, Inc. press release, October 20, 2009; "2009年云计算中国论坛专题报道" ("Cloud Computing in 2009 Forum dossier"), Chinese Institute of Electronics Cloud Computing Experts Association, http://server.it168.com; "The Cloud Wars: $100+ billion at stake," Merrill Lynch, May 7, 2008; Avenade 2009 Global Survey of Cloud Computing, http://www.avanade.com; Laurianne McLaughlin, "Cloud Computing Survey: IT Leaders See Big Promise, Have Big Security Questions," CIO Magazine, October 21, 2008.

2 Eric Auchard, "Salesforce.com Signs Citigroup Deal," Reuters.com, November 15, 2007; "Salesforce.com Powers Starbucks Campaign to Mobilize Americans in National Service," Salesforce.com press release, January 21, 2009, http://www.salesforce.com; Ron Condon, "The Opportunities and Risks of Cloud Computing Services," SearchSecurity.co.uk, February 23, 2009.

3 Ethan Smith, "Disney Touts a Way to Ditch the DVD," Wall Street Journal, October 21, 2009.

4 Ben Worthen and Justin Scheck, "Tech Giants Ramp Up Their Online Offerings," Wall Street Journal, June 22, 2009; "Cloud Services/SaaS: What Telcos Are Doing," IDC Technology Assessment, October 2009; "China Mobile Enters Sphere of Cloud Computing," Interfax, November 17, 2009; Bernard Golden, "The State of Cloud Computing in Japan," CIO.com, November 5, 2009; "SingTel to Help Establish Singapore as a Regional Cloud Computing Hub," SingTel press release, July 14, 2009; Chris Preimesberger, "Fujitsu Launches Cloud Services in North America," eWeek.com, December 8, 2009.

5 Taken from Accenture "Cloud Computing in Healthcare" deck, date Feb 19 2010, slide 6

6 Luiz André Barroso and Urs Hölzle, The Datacenter as a Computer: An Introduction to the Design of Warehouse-Scale Machines (Morgan & Claypool Publishers, 2009).

7 Condon, ibid.

8 What the Enterprise Needs to Know About Cloud Computing.

9 "Pressure Performance: 2009 IT Report," Accenture CIO Organization, November 2009.

10 "CTO Roundtable: Cloud Computing," Communications of the ACM, Volume 52, Number 8 (2009), Pages 50-56 http://queue.acm.org; Gray Hall, "Bechtel Harnesses the Cloud: Case Study of an Enterprise Cloud," Cloudstoragestrategy.com.

11 "Cloud Coockoo Land Computing," dotfuturemanifesto.blogspot.com; Andy Greenberg, "Deflating the Cloud," Forbes.com, April 15, 2009

12 "SaaS Returns Bolster Cloud Computing's Promise," Computer Economics, March 2009.

13 CIO Cloud Computing Survey," CIO Magazine, June 2009; "Clouds Beyond the Hype: Positioning for the New Era of Enterprise IT," presentation by Frank Gens, International Data Corp. to the Society for Information Management Boston chapter, June 11, 2009; McLaughlin, ibid., Avenade study, ibid.

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