CLOUD COMPUTING
IN THE HEALTHCARE ENVIRONMENT

Whether the Cloud Is Right for You and What You Should Be Doing Now

Authors: Kent Kubie, Mike Garzone, Paul Gray, and Jared Rhoads

The basic value proposition of cloud computing is to buy only the resources you need to consume when you need them, and pay accordingly.

With so much attention being paid to meeting the requirements of the electronic health records (EHR) incentive program created by the Health Information Technology for Economic and Clinical Health (HITECH) Act, provider organizations need to make a special effort not to lose sight of key opportunities for infrastructure improvement. New infrastructure technologies are available that can reduce costs, improve performance and accelerate efforts to achieve meaningful use. These benefits are critical as organizations are driven to become as lean as possible, without sacrificing quality of care or patient safety. In many cases, these opportunities can support current EHR initiatives.

Cloud computing is one promising technology that healthcare organizations can use to achieve these results. Understanding this new computing consumption model and its associated rewards and risks is the key to determining if Cloud computing is right for your computing requirements.

What Is Cloud Computing?

Cloud computing is a computing model in which shared resources are allocated dynamically to create a highly flexible and scalable computing environment. By providing hardware and software on-demand, the cloud approach allows organizations to treat computing like a service.

The basic value proposition of cloud computing is: *buy only the resources you need to consume when you need them, and pay accordingly*. For example, organizations can run applications in the cloud and pay for only what they use based on the number of virtual CPU's, available memory, storage and network utilization.

The cloud model can be used to run software, handle testing, expand storage, facilitate collaboration and more. In short, cloud enables infrastructure to be treated as a service. All of these services offer improved agility and scalability, making users feel as if they have a virtual data center at their disposal. As this new model continues to mature and as application vendors wrestle with the changing demands of their clients, consumers stand to regain control over their IT capital expenditures.

Three Types of Cloud Computing

There are several computing models emerging in the market today. It is important to select the model or combination of models that works for you. The factors that typically drive the decision of which model to utilize include:

1) Suitability of the application to a cloud-based infrastructure;
2) Compliance requirements; and
3) The strategic value of the data generated.

Organizations need to be savvy of vendors attempting to lure them into long-term agreements promising tremendous savings, but with unrealistic risk and insufficient service levels.

Public cloud computing makes use of the public Internet and shared computing resources as the medium through which to deliver services and capacity on-demand. Computing resources are hosted offsite by a third-party provider,

and users gain access to the resources via web-based applications. From the customer's perspective, the arrangement is similar to outsourcing, except the scalability is greater and the billing model more closely resembles a utility. Healthcare providers might consider workloads like email, collaboration and test/development for public clouds.

Private cloud computing offers the benefits of on-demand infrastructure but with dedicated resources to one organization. The computing resources are shared, but they are shared across applications and business units of the same organization. Another variable to private clouds is whether you put these resources on-premise or off-premise. This decision is based on perceived risk, latency considerations and the decision to own the real-estate required to house the infrastructure. Healthcare providers should consider private clouds for enterprise resource planning systems.

Hybrid cloud computing involves a combination of public and private clouds. This is common among large organizations that use cloud computing for multiple initiatives. When data and services cannot be shared between the public and private components of the two clouds, the architecture is considered static. Soon it may also be common to create more dynamic hybrid architectures, so that data and services are interchangeable as though they are located in the same virtual operating system. Supplier relationship management is a good example of an application that fits well with a hybrid model.

Finally, another model that is being proposed is the *Community Cloud*. Community Clouds are built for particular market segments, such as healthcare, that require a special set of characteristics (e.g., compliance and security measures). We have not seen these offered in the market yet, but we envision the use of a community cloud among multiple healthcare providers in the future.

Can You Leverage the Cloud?

Despite the many promising features of cloud computing, approaching this technology is not an easy task for healthcare organizations. There is no single cookie-cutter approach, as some industry vendors would like you to believe. There are many factors to consider when providing secure IT resources to organizations that need 24/7/365 availability and "Five 9's" service level agreements.

In our experience, we've found that there are at least five commonly-heard claims about cloud computing that each healthcare organization needs to evaluate for themselves:

- **Promise #1: "Cloud computing will save me money."** Cloud computing might save money, but it might cost even more. It will definitely result in shifting costs from capital expenditures to operational expense, which helps cash flow. The amount of savings will depend on many factors. Two key determinants of whether cloud will save money are: 1) how much have you already virtualized your environment, and 2) the current utilization of resources for each of your current applications. In a traditional data center, each application—and sometimes each business unit—has its own dedicated computing resources. One application might be running at 30 percent capacity while another application might be running at 50 percent capacity. When a cloud-based infrastructure is deployed, those two applications share the resources and typically drive up asset utilization much higher.

- **Promise #2: "Cloud computing simplifies the service delivery model."** This is true in a number of areas. For instance cloud computing consolidates multiple management systems into one console, allowing all elements of the data center to be controlled by a single management system. Additionally, rapid provisioning allows administrators to commission or decommission computing resources with a few mouse clicks. Finally, new applications or workloads can be started much faster, without going through the entire procurement process or testing the interoperability of the entire infrastructure.

5 frequently-heard claims about cloud computing.

- **Promise #3: "Performance in the cloud is as good, if not better."** The truth of this promise hinges on whether a given cloud is a public vs. private cloud, and on-premise vs. off-premise. Latency and uptime are critical factors in overall performance. Cloud latency is tolerable for many everyday applications, but it may not be suitable for applications that must be hyper-responsive, such as trading platforms in the financial world. Some healthcare applications are just as sensitive to responsiveness and uptime. If latency is your main driver, then an on-premise private cloud would make a better fit. How cloud will affect performance remains something that must be evaluated on an application-by-application basis.

- **Promise #4: "Migrating to the cloud is fast and turn-key."** As ESPN College Football analyst Lee Corso says, "Not so fast, my friends!" There are many moving parts to an organization's computing environment—many of which have been architected and optimized over a number of years. Unwinding these tight integrations could cause the entire structure to collapse if the wrong piece is removed. Just as one would not move an unstable patient if it would cause harm, organizations need to analyze their IT environment carefully to determine which functions can withstand migration to the cloud.

- **Promise #5: "Clouds are secure."** Security is one of the top considerations when evaluating cloud computing. Organizations need to consult a vendor that has experience with running and maintaining data centers and who has an extensive background in security for advice on what safeguards need to be in place when you make the move. If you are considering a public cloud, be aware that your data could be spread across time zones—and possibly across continents—opening up a whole new set of potential issues for organizations dealing with privacy laws that vary by jurisdiction. While it is possible to put entire business processes in the cloud, such as payroll and accounts receivable, this may not be practical for all healthcare organizations.

What You Should Be Doing Now

With an understanding of the myths and realities identified above, healthcare organizations should prepare to take advantage of the strategic opportunities that are available now, as well as the opportunities that may become available in the near future.

1. Understand your options and the related risks

What are the business drivers causing you to look at cloud models? Understanding those drivers is paramount to establishing a baseline in which to start. Closely related with the business drivers is who is making those demands. A key to success will be to understand your organization's risk profile.

Many organizations find this a difficult task to complete independently. Seeking expert advice from an experienced external systems integrator can jumpstart the analysis necessary to provide a foundation for a long-term strategic approach to cloud consumption.

From a risk standpoint, one key implication for healthcare organizations is HIPAA compliance. The recently-enacted HITECH Act expanded the HIPAA requirements for protecting health information. Under the new rules, data need to be protected regardless of whether they are at rest (e.g., in a database) or in motion (e.g., being copied, accessed or transferred). For cloud computing, this means that systems must be capable of handling and working efficiently with encrypted data, as well as tracking and auditing the location of data.

It also means that the cloud environment needs to be secure physically and logically, and that policies and procedures are in place to limit access to the data and to ensure the proper destruction of hard drives and equipment. In some cases, it may be best to strip out personally identifiable information in order to further reduce the risk of a privacy breach that would require mass notification.

2. Establish a strategy for using the cloud

After the risks have been assessed and understood, the next step is to build a strategy that will incorporate the necessary elements and timelines that match to organizational outcomes. Transitioning to cloud computing for the sake of staying with the latest technology in the hope that something good will happen is not a strategy. Building the business model that complements the elements necessary for successful cloud computing is not an easy task. It requires an intimate understanding of the drivers and areas where cloud models can be exploited.

Document a strategy that has an economically sustainable model and a well-articulated end goal. Your strategy should leave you with the destination and pathway to achieve your desired outcome. You are likely to end up with a couple of choices: one may be to build your own private cloud that can be used to refine your capital expenditure strategy, the other may be to move some of the less-critical applications to a cloud off-premise. There is no right or wrong answer here. The strategy will be very dependent on the organization's goals and the roles that IT plays within the organization.

Finally, establish clear and measurable success criteria. This will generate support from end customers and service lines within the enterprise. Clearly communicate what you are doing, why you are doing it, and how it will help drive the organization forward. Success criteria should be broader than just IT metrics. Although IT metrics are important, functional key performance indicators, executing and supporting organizational goals (e.g., average length of stay, shorting the revenue cycle) will elevate the role of IT.

3. Integrate your cloud strategy into future capital expenditures

Every new capital expenditure should be viewed in relation to how it aligns with the organization's strategy for using the cloud. When new needs arise for "bare-metal" (i.e., physical machines and servers), stop to consider how cloud alternatives might better fill the need for raw utility computing power. Assess the portfolio of resources that are available in the organization, and understand where you are in the continuum of product and application lifecycles.

This is a great opportunity to design a decision tree to establish a capital budget and cost of ownership.

A Familiar Scenario

Your organization has just received approval for the implementation of a new EHR system. You have been given compute and storage requirements from your vendor. Typically, you look at those requirements and assemble some basic configurations to handle the first phase of the EHR roll out, which is likely a combination of production, quality assurance, test, and development environments. You have had experience with this before and know that you must factor in performance workload and expected growth. You start with the vendor's configuration requirements and add capacity (storage, processors, bandwidth, etc.) to create a revised configuration, sized to appropriately support the organizations needs for the coming years. In many cases, configurations may be sized up to 40 percent above current day computing needs.

At this point, you are committed to a capital expenditure and have built in capacity, which will likely go unused until the future growth targets are met. You have committed capital and future operating expenses to the project which are now being moved across the balance sheet.

As the project progresses, user requirements continue to change as you try to solidify your production environment and resiliency plan. Since you are a healthcare provider, you must operate in a continuous 24/7/forever world, so non-stop computing is essential. You seek additional guidance from your EHR vendor and are given their best guess on environment expansion. You once again attempt to forecast business needs and derive a configuration with even more capacity to support growth and accommodate continuing user requirements change. You also request redundancy to support your disaster recovery/resiliency plan. You make another capital expenditure, feeling confident that you can support the goals of the organization, knowing that IT will not be the bottleneck of any problems that may be encountered during the go-live portion of the

project. Since you have anticipated any potential challenges, you have new equipment in your data center along with the supporting power and cooling equipment to avoid any potential disasters.

At this point you are sleeping well at night again after a 24 to 36 month roller coaster ride. Then you get a call from the CFO who asks you to cut your budget for the upcoming year. Federal healthcare legislation is starting to impact hospital operations. Revenue is impacted and potential cuts throughout the organization are being called for. Headcount is the first line item on the CFO's list of potential cost savings ideas. Knowing that patient safety and providing high-quality care are paramount to the sustainability of the hospital, clinicians and physicians are at the bottom of the list and support personnel are towards the top. As in the past, IT is a cost center and that is where a significant portion of costs just landed.

As you go through your budget line by line, the reality of past decisions start bubbling to the top. The cost of new infrastructure, although essential, ate up a lot of the budget. Reductions of your support staff is the only flexibility you have in cost reductions. Additional budget challenges pile up as dew legislation hits and your energy costs start to eat away at your already shrinking budget.

4. Build comfort with the cloud model by starting with quick victories
Migrating applications to the cloud can take some adjustment, so in order to instill confidence and manage the learning curve, start with relatively easy, low-risk items. Back office functions like reporting modules, email, data backup and customer management systems are good places to begin. Move these applications over in tempo with the server refresh cycle. This allows you to maximize your current inventory and avoids retention of capital assets any longer than necessary.

As we look back at the scenario above there are some innovative choices that could have been made, and ones that could possibly have earned the admiration of the CFO and CEO along the way.

Take for instance the initial acquisition of the infrastructure for the new electronic medical record system, especially the QA, test, and development equipment and supporting environmental infrastructure. Since this equipment has a limited useful life and the costs to maintain it over time increase, this is a potential opportunity to move it into a cloud environment. Your choices could allow you to build an infrastructure that allows for the future use of those assets in other capacities. In this case you have built a private cloud and are able to prolong the life of those assets and keeping them from being liabilities. In the event you have charge back capabilities, you can potentially generate revenue with them. This is music to the CFO's ears.

Second, consider building a private cloud infrastructure (on-premise or off-premise) sized for your initial workload, knowing that you can quickly and easily "burst" above that initial capacity. You save the cash from the capital outlay of the equipment and you pay for the cloud infrastructure as it is used. This is more music to the CFO's ears.

Next, review of the disaster recover/resiliency plan may allow you to use a private/public cloud to offload your capital costs and move them to operating expenses. Depending on the nature of the relationship you strike up with your cloud partner, this could also be used for capacity on demand type services where the system is under higher utilization than normal. This avoids a scenario in which you acquire expensive capacity that may never be used.

Finally, review the availability of procuring the EHR on as a Software as a Service basis, or partnering with a system integrator that can deploy the EHR within their cloud architecture. Several forward-thinking healthcare application vendors are moving in this direction. Review this carefully with the vendor to avoid hidden costs that are sometimes included. It is also beneficial to seek guidance from an impartial third-party advisor.

Bonus points as your staff are now learning new skills and you have become more flexible to the changing needs of your organization. Also your CFO is now a supporter of IT and has recognized your efforts to enhance the mission of the organization.

The Bottom Line

Many provider organizations have made achieving meaningful use their top priority. This is understandable. However, if organizations fail to develop a Cloud strategy, then they may miss key opportunities to save on capital expenditures today. The benefits to introducing cloud computing often accrue relatively quickly. You may even be able to use some of the capital savings gained by adopting cloud to help pay for some of the meaningful use initiatives.

About the Authors

Kent Kubie is a Sr. Business Development Executive in CSC's Healthcare Delivery Practice. Mike Garzone is an Architectural Senior Expert, responsible for CSC's Healthcare Delivery Technology Services Practice. Paul Gray is a Senior Manager with CSC's Virtual Data Center Solutions. Jared Rhoads is a Senior Research Analyst with CSC's Emerging Practices Group.

For more information, please contact us at 800.345.7672 or healthcaresector@csc.com.

Healthcare Group
3170 Fairview Park Drive
Falls Church, Virginia 22042
+1.800.345.7672
healthcaresector@csc.com

Worldwide CSC Headquarters
The Americas
3170 Fairview Park Drive
Falls Church, Virginia 22042
United States
+1.703.876.1000

Australia
26 Talavera Road
Macquarie Park, NSW 2113
Australia
+61(0)29034.3000

Asia
20 Anson Road #11-01
Twenty Anson
Singapore 079912
Republic of Singapore
+65.6221.9095

About CSC
*The mission of CSC is to be a global leader in providing
technology-enabled business solutions and services.*

*With the broadest range of capabilities, CSC offers clients
the solutions they need to manage complexity, focus on
core businesses, collaborate with partners and clients,
and improve operations.*

*CSC makes a special point of understanding its clients and
provides experts with real-world experience to work with
them. CSC is vendor-independent, delivering solutions that
best meet each client's unique requirements.*

*For more than 50 years, clients in industries and governments
worldwide have trusted CSC with their business process and
information systems outsourcing, systems integration and
consulting needs.*

*The company trades on the New York Stock Exchange under
the symbol "CSC."*

www.csc.com