Health Care Community Cloud

An initiative of the HealthCare Services Platform Consortium (HSPC)

Introduction

Cloud computing has had a broad impact on a wide range of industries since its inception. Many believe the technology needs in health care are ones that could benefit the most from the advantages cloud computing offers.[1] However, for cultural and business reasons, the adoption of cloud computing in health care has lagged significantly in comparison with other sectors of the economy. In the last few years, the advantages of cloud computing for health care has been called out with increasing specificity and fervor. [2][3]

The Healthcare Services Platform Consortium seeks to bring together a provider-led, patient-centered consortium of providers, technology innovators and others to further the adoption of cloud-based, open interface and open architecture solutions to bring forth the health IT innovation the health care community sorely needs.

In order to bring about this cloud-based approach, a more concerted effort to establish a Healthcare Community Cloud is warranted. Such a community cloud would naturally leverage all the security, scalability and elasticity advantages of existing public cloud computing. In addition, it would incorporate governance capabilities that would screen participants and limit them to HIPAA-covered entities and their business associates.[4] By having a dedicated cloud computing environment for the healthcare sector (where all participants are 'vetted'), this will help overcome the barriers many healthcare organizations have to adopting cloud computing because of the perception that cloud computing represents a 'wild west' in which the sensitive healthcare data would be vulnerable to all the vagaries of the open internet.

In addition to the security and privacy advantages, having dedicated cloud computing environment for health care would help foster a diverse, vibrant ecosystem of technology providers that would, for the first time ever, have a secure, BAA-enabled computing environment in which to offer their solutions.

As HSPC goes about establishing open reference architectures for health care, said architectures would be readily accessible to the entire healthcare community greatly increasing efficiencies and reducing time to market.

Finally, it is important to note that health care organizations are universally under pressure to take a closer look at their existing information technology costs and plan for substantial cuts in the current cost picture. All this at the same time that many organizations are installing expensive EHR solutions. A fully-functional, robust healthcare community cloud would enable health care organizations to fundamentally restructure their IT expenditures and begin the substantive modernization push that all organizations wish to mount, but are constrained due to the need to maintain brittle legacy systems and technological approaches.

This document addresses several aspects relevant to establishing such a computing environment and recommends next steps necessary to establishing such an environment.

Current State of Cloud Adoption in Healthcare

While healthcare is considerably lagging in its adoption of cloud computing (even among enterprise customers who, themselves, have lagged behind the web native/startup space), there has been a noticeable and substantive increase in cloud computing in healthcare.

The predominant use of cloud computing in health care has been in the Software as a Service (SaaS) arena (Practice Fusion, AthenaHealth, etc.). Such adoption is an encouraging sign. However, we wish to make the distinction between 'cloud' based SaaS solutions and the more flexible approaches that characterize the IaaS and PaaS service models of cloud computing. Given HSPC is advocating for open architectures and open interfaces with broadly-adopted 'separation of concerns,' it is clear that merely offering stove-pipe SaaS solutions that are merely delivered in the cloud does not offer the qualitative change we need in order to accelerate innovation in the most optimal way. It should be noted, however, that the presence of an HCC would offer similar customer-acquisition advantages to health care-specific SaaS applications as well as provide a viable migration path to more modern architectures and deeper collaborations with complimentary software and service providers.

Establishing the HCC will allow these additional platform services and application products to emerge in a well-defined environment.

Background

While there has not yet been widespread understanding of the advantages of utilizing the cloud for health care, some voices have outlined the potential advantages that could accrue from taking another path:

- [Healthcare IT News: How to design next-generation EHR data models](#)
- [Establishing an EMR Application Ecosystem](#)

A consensus estimate is that the worldwide addressable market for Health IT will exceed US$24 billion by 2015.[5] In light of this opportunity, a number of health care providers have embarked on various technology business ventures that show strong signals of the need for innovation in this space:

The timing is right to forge a new approach to enabling broader innovation in health information technology - leveraging the cloud is the key. However, given the nature of the challenges in health care, a novel approach is called for. This approach needs to take into account the special needs of the health care providers as well as the importance of enabling experts in every arena to contribute their expertise in addressing these big challenges.

Could establishing a Community Cloud for health care address many of the central impediments to cloud adoption for health care? The Community Cloud deployment model is not widely understood or

discussed.[6] However, the NIST definition of cloud computing[7] spells out its contours alongside the more widely known public and private cloud models:

> Community cloud. The cloud infrastructure is provisioned for exclusive use by a specific community of consumers from organizations that have shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be owned, managed, and operated by one or more of the organizations in the community, a third party, or some combination of them, and it may exist on or off premises.[8]

There are obviously shared regulatory, statutory, security and privacy requirements among health care providers. The deep and complex challenges related to delivering health information technology could certainly benefit from sharing common capabilities such as infrastructure certification policy adherence. The specific data requirements related to medical and billing terminologies are those that apply to all providers and from which all providers can benefit. Sharing robust, well-tested and validated underlying services is an example of "pre-competitive collaboration"[9] that obviates the need for *each* organization to stand up such commonly-needed services, thereby enabling health care providers to focus on what truly differentiates them: their ability to deliver caring, quality clinical care to their patients.

Establishing such a community cloud would not only be of benefit to health care providers, it would also provide new opportunities for cloud computing infrastructure providers to offer tailored services to a lucrative market into which they have very little penetration currently.

Moreover, given the presence of a specialized computing infrastructure, it has the potential to unleash a wave of innovation as specialized services in a wide range of vital needs can become easily available to health care providers who can benefit from such services. Here are a few examples:

- Standards-based data acquisition, aggregation and quality enrichment
- Intelligent cohort definition
- Population health services
- Tailored big-data analytics
- Clinical rules engine processing
- Clinical natural language processing
- Custom-built end-user interaction models

Based on these clearly-stated needs, the advantages of community cloud for health care should become abundantly clear.

In addition, there are emerging examples of other industries embarking on similar paths. An example is The Capital Markets Community Platform serving the global financial services industry:

- [Forbes: NYSE Brings Capitalism to the Cloud](#)
- [Video: The 4th Wave of Cloud Computing - NYSE Technologies Community Cloud](#)
- [BusinessWire: NYSE Technologies Introduces the World's First Capital Markets Community Platform](#)
- [Intel, VMware, EMC Supply Infrastructure for NYSE Capital Markets Cloud](#)

In addition, both Amazon Web Services and Microsoft Azure offer community clouds for their government customers:

- [AWS GovCloud Region](#)
- [Information Week: Microsoft Reveals Azure Cloud For Government Agencies](#)

While in the government community cloud examples noted above, the infrastructure was created in dedicated real estate due to ITAR (International Traffic in Arms Regulations)[10], it should be noted that there are no such explicit regulations of this type for health care in the US. It should be possible to create such a community cloud on already present computing infrastructure.

The challenge is not the technology. The challenges are establishing the security and privacy contours, business incentives, value networks and intended outcomes that benefit patients and the providers of care while enabling robust competition and innovation.

The Collaboration Imperative

While HSPC has an obvious incentive to further this concept as it can be an important element of the overall Consortium value proposition, the ability to execute on this opportunity is dependent on identifying appropriate collaborators. First, HSPC will need to identify collaborators who have a proven track record of delivering cloud computing capabilities to the health care sector. If this collaboration is done well, has the potential to rapidly reshape the world of health IT.

HSPC Contributions

As the sole health care consortium that is provider-led and committed to open architectures, open interfaces and heterogeneous technology ecosystems, HSPC is in a unique position to work with a cloud computing provider to do the following:

- Establish reference architectures and implementations that are tuned to the needs of health care providers
- Instantiate "application frameworks" that would enable consistent user interaction models that align with real-life care team workflows and mental models
- Collaborate with platform services and app developers to address the end-to-end IT needs of select customers
- As more health care providers and technology solution providers engage with HSPC, it will become a major 'match maker' to rapidly enable complimentary needs to be met and lead to rapidly-developed solutions owing to the presence of the hyper-scale cloud computing services.

Infrastructure Player Contributions

Having market leading infrastructure services is a must. In addition, having acumen in the area of security risk assessments and risk mitigation would be essential.

Additional Thoughts

In order to bring this concept to fruition, collaborative agreements must be struck between HSPC and potential infrastructure computing collaborators.

The wave of EHR adoption precipitated by the HITECH Act has significantly increased the adoption of the current generation of EHR technologies. Now that there is widespread use of EHRs there is a growing understanding of the need to significantly increase the quality and interoperability of such products and to find a way to enable healthcare to benefit from the fast-paced innovation that is prevalent in the rest of the digital economy.

The HCC would be established by a broad collaboration of health care providers who would benefit by immediate cost reduction (by reducing or eliminating the need to build/maintain their own computing infrastructure) and potentially significant increase in high-quality computing services. This HSPC-led collaboration would engage in partnership with a range of technology providers who would provide platform services and new end user apps as well offer an environment in which existing SaaS solutions might be hosted.

Participation in this community cloud would need to be well-governed by health care organizations who bear the ultimate responsibility for the use of clinical data. In general, the community cloud would be made available only to HIPAA Covered Entities and their Business Associates. All traffic in and out of the infrastructure would be encrypted using state-of-the-art techniques. Access to the resources in this cloud would be mediated by digital certificates that will allow for auditing of activities in the (unlikely) event malicious activity is detected. Such a service would also enable providers to establish network-isolated regions in the cloud environment to enable even further assurance that any one institution's information is kept isolated from others. Yet, given these separate instances would be in close networking proximity (or at very least sharing very similar infrastructure topologies) interoperability services between institutions would be made much more seamless and friction free.

Finally, it must be acknowledged that owing to the important data that would be stored in such a service, the community would immediately become a target for hackers. The services must be designed orchestrated using state-of-the art approaches to risk mitigation, and *never* put a large corpus of all the provider data into one 'place' making it too attractive a target for hackers.

The Incremental Approach

The potential value of establishing the Community Cloud is great. However, our path to getting there must be defined by some attainable incremental steps along the way. The path to getting there will involve the following:

1. Identifying the most critical market needs that can be realistically addressed
2. Working with our Consortium members to specify and developing the best solutions for addressing those needs, and
3. Engaging the broader marketplace to drive demand for these initial solutions/architectures among prospective customers.

[1] This document does not specify the widely-understood advantages of cloud computing and the enormous business impact that this mode of computing has had on worldwide commerce. There will be pointers to various references in the appendix that will provide references that provide that background

[2] Forbes: Why Healthcare Must Embrace Cloud Computing

[3] Accenture: A new era for the healthcare industry - Cloud computing changes the game

[4] US Only for now (HIPAA not applicable outside the US. Other criteria would need to be applied)

[5] Research and Markets: The Future of the Healthcare IT Market to 2015

[6] The Community Cloud

[7] The NIST Definition of Cloud Computing

[8] The NIST Definition of Cloud Computing p. 7

[9] IOM: Open Innovation Networks:

[10] International Traffic in Arms Regulations