Clearing Up the Cloud Haze:

Understanding the differences, benefits and myths of cloud-based electronic medical records systems

Change isn't easy, and it can be disruptive, especially if you aren't prepared for it.

The word cloud likely forms an image in your mind of something nebulous and amorphous – not exactly an image you normally associate with your practice of medicine or your most mission-critical systems. Yet, you've likely heard a lot about "the cloud" and cloud-based electronic medical record (EMR) systems, or perhaps you're contemplating implementing one in your practice.

It may seem that there's more hype than clarity when it comes to understanding a truly cloud-based EMR system and how it compares to the alternatives, so this paper will help illustrate the differences between cloud-based and traditional client-server EMR systems. It will sort truth from myth surrounding cloud solutions, and give you insights into the questions to ask – and answers you should expect – when selecting a cloud-based EMR system and vendor.

What defines a cloud service?

Trasparent scalibility and shared infrastructure. Wares are deliv-ered in a multitenated fashion.

What is Cloud Computing?

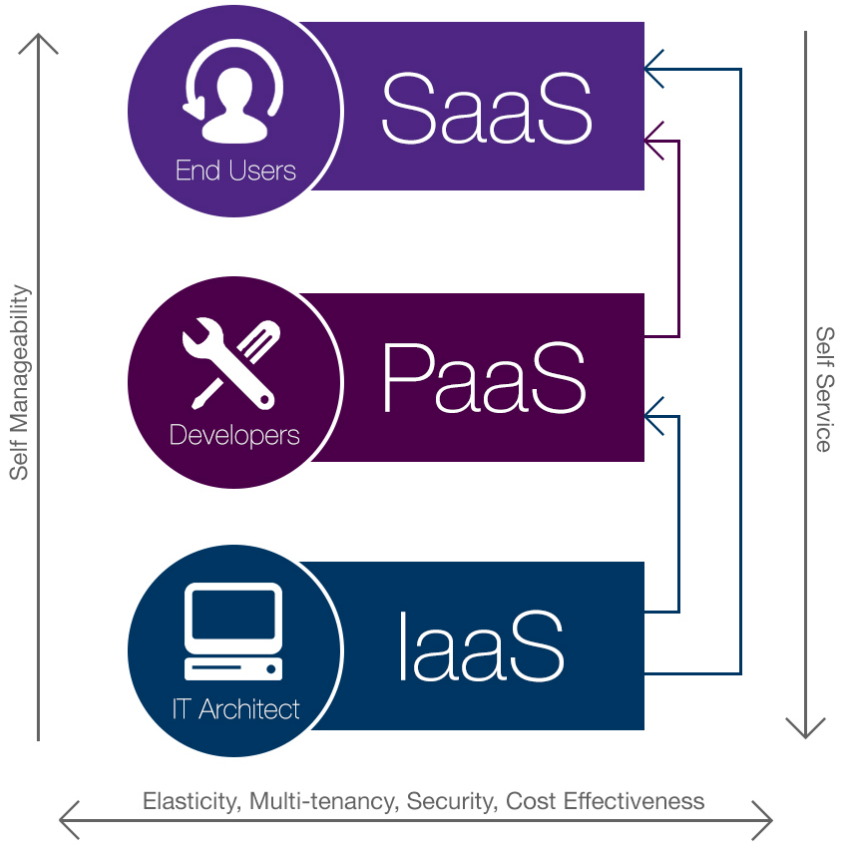
The term cloud computing is most often associated with the cloud symbol often used in diagrams and flowcharts to represent the Internet, leading us to believe that it is there somewhere up in the air. That image adds to our vague sense of what the cloud really is and conjures visions of our data floating around everywhere – a myth about the cloud.

Many people compare cloud computing with the utility model for delivery of electricity, as both are metered, dynamic, on-demand services and both travel through conduits. However, unlike electricity, which is measured by the flow of electrons, cloud computing is not measured by data flow. Cloud computing is about service provision, whether computational to collect, manage, or manipulate data; storage, to warehouse or distribute data; or communication, to transport data. In its simplest form, cloud computing provides on-demand access – typically over the Internet – to a shared pool of distributed virtual hardware or software resources as a managed service.

What is Cloud Computing? (cont'd)

Cloud computing is generally presented as three service models, and providers may use services from multiple vendors to create the final product:

- **Software-as-a-Service (SaaS)** provides seamless application delivery. The customer does not manage or control underlying infrastructure. Yahoo! Mail, Gmail, Dropbox and Salesforce are examples of SaaS products.
- **Platform as a Service (PaaS)** provides hosted software and product development tools that developers utilize to create applications on the provider's platform over the Internet using application program interface modules (APIs), website portals or gateway software. The customer retains control of deployed actions & possibly application hosting environment configuration. Examples of PaaS vendors include Amzon EC2, Google Apps and MS Windows Azure.
- **Infrastructure as a Service (IaaS)** provides hardware, network and operating system resources including virtual server instances with unique network IP addresses and blocks of storage on demand activated by provider's API to start, stop, access, and configure their virtual servers and storage. Capacity is dynamically allocated or released as required with the client paying for only as much capacity as is needed. The customer retains control over operating systems, storage, deployed applications, and possibly limited control of select networking components. Amazon AWS is an example of an IaaS provider.



Types of Cloud Computing

To take the understanding of the cloud one step further, there are also various cloud deployment models, each with their own architecture, advantages, cost structures and preferred use cases. Cloud deployment models include private cloud, virtual private cloud (VPC), public cloud, community cloud and hybrid cloud.

A **public cloud** is the most readily available and cost efficient model with low entry cost because resources are shared widely among multiple customers, but public clouds also present the highest risk as multiple customers could be using virtual instances that share the same physical architecture and memory simultaneously. Additional resources are available on a per virtual instance basis, which again could include shared physical or memory resources. Anyone with a credit card can rent time on a public cloud, and there is no control over who your neighbors are.

Virtual private clouds (VPCs) operate solely for an organization but are located as a subset of a larger cloud infrastructure. VPCs provide higher levels of trust, security, and control than a completely public cloud while providing much of the lower cost structure, technical expertise and support of a public cloud. A VPC with this configuration is equivalent to leasing office space in a large commercial building where the tenant has a large degree of control and separation from other tenants.

A **private cloud** is operated solely for an individual organization and can be located either on or off premises with management by either the organization or a third party. Private clouds can provide automation and elasticity benefits associated with cloud computing while still retaining visibility and control. However, on the downside, private clouds are very expensive with a large upfront investment and recurring maintenance costs. Additionally, they do not provide the cost savings of a shared utility-like service.

A **community cloud** is shared by several organizations with shared concerns and interests. It provides more trust, security and control than a public cloud as you know your neighbors, and costs less than a dedicated private cloud. A major drawback is that negotiating control, licensing and other legal factors present hurdles to widespread use of the model.

A **hybrid cloud** infrastructure is a composition of two or more cloud models that remain unique entities but are connected by standardized or proprietary technology to enable data and application portability. Hybrid clouds can offer the flexibility to rapidly change deployments in order to meet changing business needs. Some implementation examples include leveraging a SaaS application from a public cloud to process data held in a private cloud; occasional excess demand requiring temporary use of additional capacity from the public cloud to meet seasonal demand for a retailer; or as a disaster recovery option, storing a backup of a server image on a VPC in case of a disaster for quick conversion to a hot site.

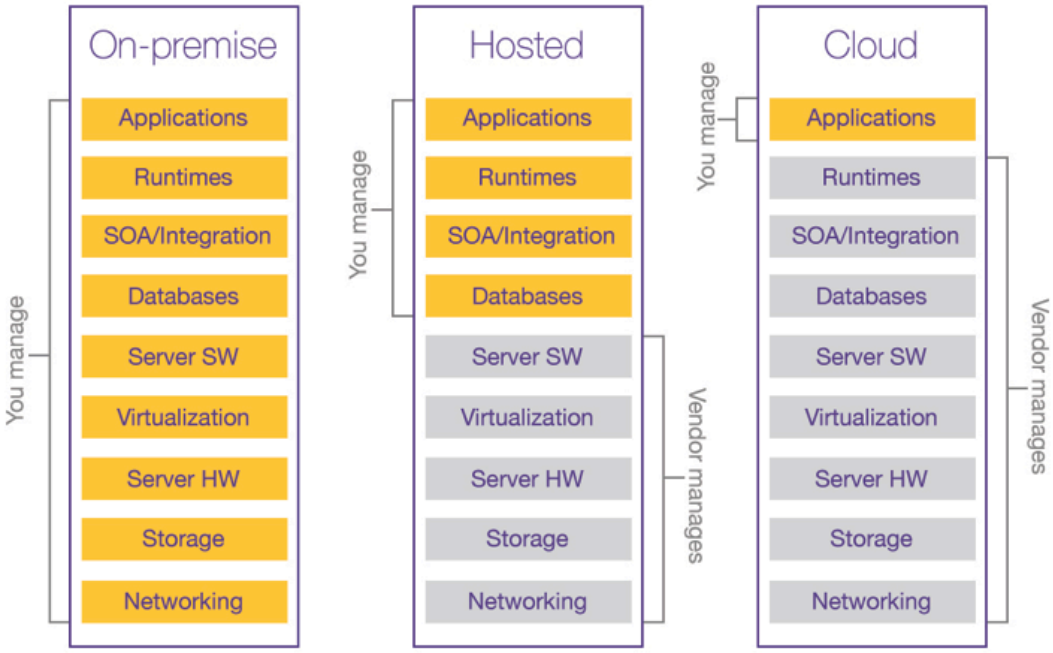
Cloud versus Client-Server-based EMR Systems

A cloud-based EMR system is delivered as a SaaS product on demand to users via Web services and a browser or mobile device such as an iPad. The EMR software and data aren't stored on a practice's servers or computers, but rather the SaaS EMR application can be securely accessed via almost any device with a Web browser and Internet connectivity. Users typically subscribe to the service for a fixed monthly fee.

A cloud-based EMR system differs greatly from a traditional client-server EMR system. In a client-server system, the application is purchased, installed and supported on a server located on-premise at the practice and accessed over a local area network by computers with corresponding vendor-provided client software installed on them. Data is stored locally on the computing device. Significant IT resources and staff are required to maintain on-premise EMR systems, backup patient records, and implement software updates and bug fixes from the vendor on an ongoing basis.

Think added resources, time and equipment when you think of client-server solutions. Some individuals who lack familiarity of or confidence in cloud technology may feel that the optimal way to keep their data safe is by using an on-site, client-server solution. But your practice's vulnerability is increased because a fire, hurricane or other disaster could swiftly destroy your computers causing data to be lost and business to come to a grinding halt. By comparison, using a client-server solution is like keeping your money at home, stuffed in a mattress.

All cloud-based EMR systems are not the same. While some providers may claim to offer "cloud" services, they are in essence merely providing legacy client-server based technology from an outsourced location via the Internet. These Application Service Providers, or ASPs, are not true cloud providers, and are bound by many of the same restrictions as an on-premises client-server solution. ASPs do not provide the elasticity of true cloud applications that allow scalable growth or reduction in resources on demand, location independence or device freedom provided through the use of Web services and browser user interface. Most ASPs will also be "web-enabled," meaning that information can be accessed through a web browser if necessary, but the browser access will tend to have certain disadvantages, like slower load times and less intuitive functionality.



Systems

On-premis Client-server, Hosted ASP Client-serve, and Cloud-based Systems.

In the past, client-server EMR systems were the only choice for providers, but cloud-based systems have rapidly gained popularity as physicians have become increasingly comfortable with the cloud as a delivery method for their EMR systems. In a Black Book Rankings poll, 70 percent of providers who are considering switching their EMR vendors in the next year say they would most consider switching to a Web-Based or SaaS solution.[1] This includes providers who would consider switching from an on-premise EMR solution to a SaaS solution, as well as those currently using a SaaS solution who would consider switching to another one.[2]

(1) & (2) "2013: Year of the Big EHR Switch," Black Book Rankings Research

Solid Reasons Physicians Are Selecting Cloud-based EMR Systems

There are many reasons why providers are migrating away from client-server EMR systems and embracing the cloud. Consider these advantages of a cloud-based EMR system to your practice:

"I like that with a cloud-based system I don't have to pay for backup every month. It eliminates that cost and worry. I can also access the system from anywhere, which is a great convenience."

– Martha Robinson, MD

- **Faster implementation with low upfront investment.** A cloud-based EMR system will enable you to get up-and-running quickly; it only requires an Internet connection and the computing devices that will access it. Cloud-based systems have low upfront implementation fees and are billed on a flexible monthly "pay-as-you-go" model similar to utility pricing. In contrast, a client-server EMR system can require you to invest thousands, or even tens of thousands, of dollars in server hardware and system configuration before you can use it. The implementation period may take weeks and can disrupt your practice's workflow, impacting your productivity and revenues.

- **No maintenance.** In a cloud-based model, both the EMR application software and the hardware infrastructure is maintained and updated by the service vendor. With a client server-system, you'll need to maintain your own IT hardware and software and hire or dedicate staff to fulfill IT functions.

- **Lower impact to productivity.** In a cloud-based model, updates to the EMR application occur almost transparently through Web services, and require no downtime to update software or implement new features. In many cases, you won't even know an update occurred other than recognizing new enhancements.

- **Reduced potential risk of data breach.** Cloud-based EMR systems do not need to store patient information on the local device, so the theft or loss of a computing device should not expose a physician to a fine for exposure of protected patient information. In May 2014, two New York hospitals were fined $4.8 million related to an incident when a physician attempted to deactivate a personally owned computer server that contained electronic protected health information of New York-Presbyterian patients. (Source: 08 May 2014 by Brandan)

- **Improved business continuity protection.** Cloud-based EMR systems are location independent, and quality SaaS providers have multiple geographically located sites to provide maximum uptime and prevent interruption of service. Unlike a server in your office, cloud-based EMR systems are not nearly as vulnerable to theft, sabotage, employee error or physical damage by fire or flood.

- **Increased accessibility and mobility.** With a cloud-based EMR system, you gain the flexibility to access your system from almost anywhere via the Internet, including on the latest mobile devices such as iPads and iPhones if the cloud application vendor supports them. In contrast, a client-server solution will require you to access the system only on computers within your practice that have the software installed on them. You're tied to your office and so is your data.

- **Lower overall cost.** Beyond the implementation and ongoing IT support costs, client-server EMR systems can incur additional expenses for your practice, such as the cost of regularly backing up the system and securing offsite storage of backups. You'll also typically need to replace your server hardware every 3-5 years, so your initial investment likely isn't a one-time expense. The system's performance can also slow dramatically as the server ages, potentially impacting your productivity. Client-server EMR vendors typically charge for updates and newer versions of the software, so new features – like those you'll need to address government compliance regulations such as ICD-10 and Meaningful Use – can result in additional fees. You may also need to upgrade your server hardware with additional capacity to accommodate the newer versions or to adapt to increase in your practice size. Without these investments, you may be stuck with an old system that can't meet your demands or carry you forward. These expenses can be averted with a cloud-based EMR system. Practices automatically receive the latest version of the application at no additional cost, and can more easily plan their budgets based on the fixed monthly fee.

In addition to these advantages, a cloud-based EMR system can facilitate a more strategic use of your practice's resources. Instead of having to spend your time and energy distracted by IT issues and concerns, you can be freed up to focus instead on patient care and on other more profitable aspects of running your practice.

> *"We're a giant group, and we absolutely refused to implement a client server-based EMR system. We didn't want to create an onsite technical institute where we had to pay IT staff to run our servers and troubleshoot problems. That's not the business we're in. The server-based systems were also very expensive. We wanted a solution that was cloud-based, flexible, reasonably priced and didn't require onsite IT support."*
>
> – Matthew Harris, MD
> Illinois Dermatology Institute

Myths about Cloud-based EMR Systems

Despite all of the advantages of a cloud-based EMR system, you may have concerns about its perceived risks – or have heard some outright myths – that may discourage you from embracing one. Here are some common misconceptions and the truths behind them:

Lag times & latency of data traveling over the Internet will slow you down.

High speed Internet service is ubiquitous in most areas, and data travels over the network very quickly. You likely take for granted how quickly the Internet performs when you surf the Web at home, and a cloud-based EMR system runs just as fast. If productivity is your main concern, focus on finding an EMR system that is well-designed and well-implemented. A well-designed, cloud-based EMR system can get you up-and-running quickly and deliver substantial time-savings every day, resulting in a much bigger boost to your productivity than whether or not the system is delivered locally or via the cloud.

Your data won't be secure if it's in the cloud.

Patient data in your cloud-based EMR system actually can be more secure than the data in paper charts or in an EMR system running on a server in your office. Most cloud EMR vendors host their applications in state-of-the-art data centers with high encryption, with data protected both at rest in storage in an encrypted state, as well as during all communications between the cloud and your device. The systems are provisioned with duplicate systems ("redundancies") that replicate the data and can function as a backup, if needed. Some cloud providers, such as Amazon S3, for instance, not only have data in transit encrypted, but also the database files and static files, providing end-to-end encryption.

You won't own your data if it's in the cloud.

This is simply untrue. Just like the funds in your online bank account belong to you, the data in your cloud-based EMR system is yours. You can access it at almost any time – even more flexibly than data hosted on other types of systems. And if you decide to leave a cloud vendor, the vendor could, for example, export your data to a hard drive or DVD and provide it to you.

Your patient data may be compromised if it is commingled with other data.

Most cloud-based EMR vendors have strict internal security safeguards in place to prevent unauthorized access to your patient data. The event of a security breach is unlikely. Look for an EMR system vendor that has high security standards in place with an excellent track record of keeping data safe.

Your charts will be inaccessible every time there's an Internet outage.

In most areas, Internet outages are a very rare occurrence. And, if you access your EMR via an iPad with 3G or 4G, in the rare event of an outage from your Internet service provider, you can simply switch to your cellular data plan and continue accessing your system. An additional option is to get a secondary, low-cost Internet line, such Cable, DSL, or satellite to use as a backup, if needed. Many markets also offer cellular broadband as a backup, and multiple 3G and 4G "lines" can be combined to provide equivalent bandwidth to traditional broadband service. Realistically, some security concerns still exist with cloud computing, such as shared technology vulnerabilities and data hijacking, but if using a provider that practices the highest standards of data protection, the convenience and benefits outweigh the risks.

Questions You Should Ask Cloud-based EMR Vendors

"The cloud-based system has proven to be a big positive for us. We feel secure about our data being in the cloud, and the cloud was a clear choice for our practice, based on its cost-efficiency and flexibility."

– Martha Robinson, MD

When evaluating potential cloud-based EMR vendors, you can ask some key questions that will help you to better educate yourself about their solutions. The answers to these questions can help you to identify the best system for your practice:

Where will my data be stored, and what levels of security are in place?

Your cloud based EMR system should be hosted in a state-of-the-art commercial data center secured with "high grade" (AES-256 256-bit) encryption, the same level of encryption that banks use for online transactions and the National Security Agency (NSA) requires for storage of top secret documents. All communications to and from the servers and your computing device should be encrypted at this level, enabling you to securely access your data via almost any type of network connection. Again, encrypting data files at rest is an additional safeguard and best practice in data security.

The American Medical Association (AMA) recommends that you select cloud computing operations that are housed in commercial data centers with a security rating of "tier 2" or higher, and that your data resides on encrypted servers[3]

Your cloud based EMR system should also support use of a VPN, or virtual private network, to enable your own "private" session across the Internet where the entire communications path is encrypted from end-to-end. VPNs are available as software, hardware, or provider solutions, and are essential for use on a public network such as a coffee house or open wireless network.

(3) "Is application service provider (ASP) software or cloud computing service right for your practice?" American Medical Association, 2011

Are your data centers HIPAA compliant?
According to the AMA, even though a cloud provider will host your EMR system, you'll still need to ensure that the data centers they use to host your data are secure and have all the necessary attributes to comply with Health Insurance Portability and Accountability Act (HIPAA) regulations.[4]

What is your business continuity plan? How are you backing up my data?
Look for a vendor that hosts their application on a cloud platform with built-in redundancies, such as multiple power supplies, multiple network controllers and duplicate backup servers. Beyond that, your data should be replicated in real-time across multiple zones in the data center, and if possible, backed-up in different regions of the country. This will give the vendor the ability to switch over to the backup in another region, in the unlikely case of a catastrophic event.

Is your system only "hosted" in the cloud, or has it been written specifically as a Web application?
Some EMR vendors claim that their systems run as SaaS when they are really a client server-based application being hosted on a remote server. In these cases, you likely won't enjoy the benefits of a true SaaS model, such as immediate setup of the application, frequent and automatic updates, device independence and high speed.

Does your EMR system work on mobile devices?
Cloud computing services offer great flexibility and the ability to access the application from almost anywhere. Ask the vendor how their system performs on the latest mobile devices, including iPads and iPhones. Ask for a live demo to see it in action. Moreover, look for an EMR vendor offering a solution as a native application that can be accessed more easily without a browser. Applications, as opposed to web-based solutions, can result in a faster, richer user experience with better device features.

Does your cloud-based EMR offer multiple levels of access?
Some vendors will have different levels of data accessibility for administrative staff than for doctors, reducing the risk of inappropriate access to protected patient information.

What type of customer support do you offer?
Superior customer support is key to a successful EMR implementation – even more so for a cloud-based system. Unlike client-server EMR vendors who can sell you software and move on, a cloud EMR vendor has to earn your business every month. Look for a vendor who offers a variety of support options, including a dedicated account manager and access to a customer support community. Understand how frequently and in what manner you'll receive notifications about software updates and other improvements.

(4) "Is application service provider (ASP) software or cloud computing service right for your practice?" American Medical Association, 2011

In addition to these questions, you should look for a cloud vendor with a highly positive online reputation and a fast growing customer base. Additionally, a company that regularly receives awards and industry recognition tends to be of higher caliber and can become a true partner to support your practice over the long run.

Build a Solid Foundation in the cloud

A cloud-based EMR system can truly transform your practice. It can change the way you and your staff work, both within and outside of the office. It can deliver unprecedented flexibility, efficiencies and cost-savings. The advantages of the cloud are numerous and can provide a very "down to earth" foundation from which your practice can continue to grow and prosper. Keep in mind that while using a cloud-based solution can result in more mobility, greater convenience, reduced costs and maintenance headaches, just having cloud-delivered capabilities is not a sufficient benefit in choosing a new EMR system. However, if you select a specialty-specific system that is intuitive and adaptable, one that is template-free and documents plus codes an exam without typing all in the cloud, you will get the ultimate in cloud EMR systems.

> ***"Having a cloud-based EMR system helps me provide better patient care. For example, when I'm on call and covering for one of my partners, I can pull up a patient's record from wherever I am and see the whole picture. Patients like the personal attention and I like it too."***
>
> – Eileen Deignan, MD
> Dermatology Associates of Concord

Navigate to a Better Place

Cloud computing represents a major change, but it can be for the better. With the right tools and technology, you could navigate this change and land in a better place, both financially and operationally.

Modernizing Medicine's Electronic Medical Assistant® (EMA™) can help you chart a new path to cloud computing and beyond.

Take a look at the EMR system that is charting a cost-effective and simple course to cloud computing at www.modmed.com

Additional Cloud Computing Resources:

Year of the Big EHR Switch
Black Book Rankings Research

Is Application Service Provider (ASP) Software or Cloud Computing Service Right for Your Practice? American Medical Association
http://www.ama-assn.org/resources/doc/psa/software-as-service.pdf

Modernizing Medicine® is transforming how healthcare information is created, consumed and utilized in order to increase efficiency and improve outcomes. Our product, Electronic Medical Assistant® (EMA™), is a cloud-based, specialty-specific electronic medical record (EMR) system with a massive library of built-in medical content, designed to save physicians time. Available as a native iPad application or from almost any web-enabled Mac or PC, EMA adapts to each provider's unique style of practice and is designed to interface with hundreds of different practice management systems. Today, Modernizing Medicine provides specialty-specific offerings for the dermatology, ophthalmology, orthopedics, otolaryngology, plastic and cosmetic surgery markets, and to more than 1,300 physician practices across the country. Most recently, Modernizing Medicine won the Red Herring and US Chamber of Commerce awards. In 2013, Modernizing Medicine was listed on Forbes' annual ranking of America's Most Promising Companies.

MODERNIZING MEDICINE