MACH7

Independence through Innovation

Ahead in the Cloud

By Eliot Siegel, MD | Non-Executive Director, Mach7

About the Author

Dr. Eliot Siegel is a prominent thought leader in radiology, imaging informatics, and the application of artificial intelligence in medicine. He is currently Professor and was formerly Vice Chair of Information Systems at the University of Maryland School of Medicine, Department of Diagnostic Radiology. He also formerly served as Chief of Radiology and Nuclear Medicine for the Veterans Affairs Maryland Health Care System, both in Baltimore, MD. Additionally, he holds adjunct professorships in computer science and biomedical engineering at the undergraduate campuses of the University of Maryland.

New Horizons:

The Cloud is Reshaping Healthcare

The migration of imaging data and patient information to the cloud is a central topic in healthcare and imaging informatics. Despite the challenges and needs that must be addressed, market research indicates growing acceptance of cloud solutions among healthcare IT professionals. These professionals are increasingly adopting the cloud for hosting and managing patient imaging data and preparing for the implementation of cloud-hosted systems.

According to Signify Research[1], in 2023, approximately 45% of the radiology IT market in the US utilized cloud-hosted solutions (either hybrid or hosted cloud instances), making the US the most willing adopter of cloud-hosted solutions in imaging IT. This figure is projected to increase to over 65% by 2028, significantly exceeding the global average.

The increasing adoption of the cloud has influenced the delivery of these systems, driving customers toward a Software-as-a-Service (SaaS) business model. However, varying definitions of cloud strategies and SaaS pricing structures create confusion and potential risks for adoption. As cloud and SaaS models mature, imaging IT vendors will need to prioritize transparency and market education to help providers understand the implications of this transition.

In my experience, cloud service providers offer secure and proven technologies to support the growing trend of cloud-hosted imaging environments, and trust in these technology platforms among IT professionals is generally increasing.

Perspectives

Over 30 years ago, at the Baltimore VA Medical Center, we established the world's first filmless digital radiology department. We implemented public and private communication methods to connect modalities, reading workstations, and computers. Within a few years, it became clear that the radiology department was at the forefront of digital transformation, representing the hospital's only true digital network.

The potential of this technology to transform the industry was quickly recognized. Consequently, IT departments reasserted control over storage and networking, directing radiologists to concentrate on clinical workflow.

This dynamic has evolved to where expertise in data storage, communication, security, and management is largely centered within healthcare IT's vendor neutral archives (VNAs) and cloud solutions. Hospital IT staff can now leverage vendor solutions to meet modern imaging and informatics storage and data management needs across the enterprise, while focusing on business proficiency, performance, and continuity.

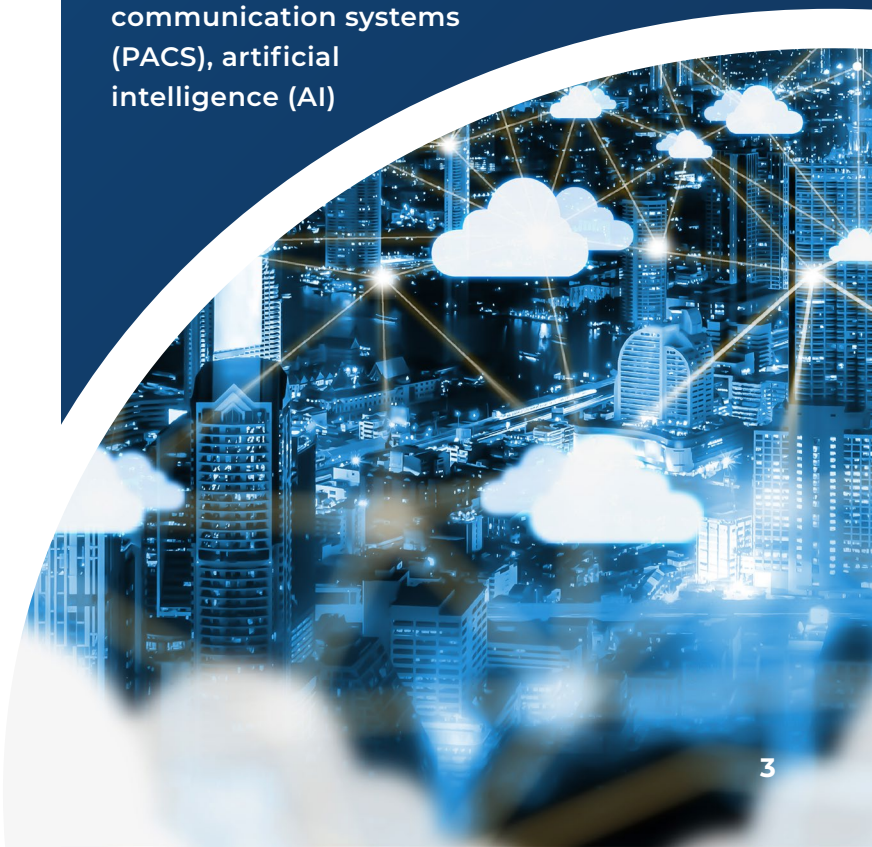
As a result, hospitals are partnering with enterprise imaging experts like **Mach7 Technologies (Mach7)** to facilitate confident management and distribution of images within and outside the hospital. This consolidation of imaging into the patient record allows for easy access to support clinical workflows and diagnostic reading.

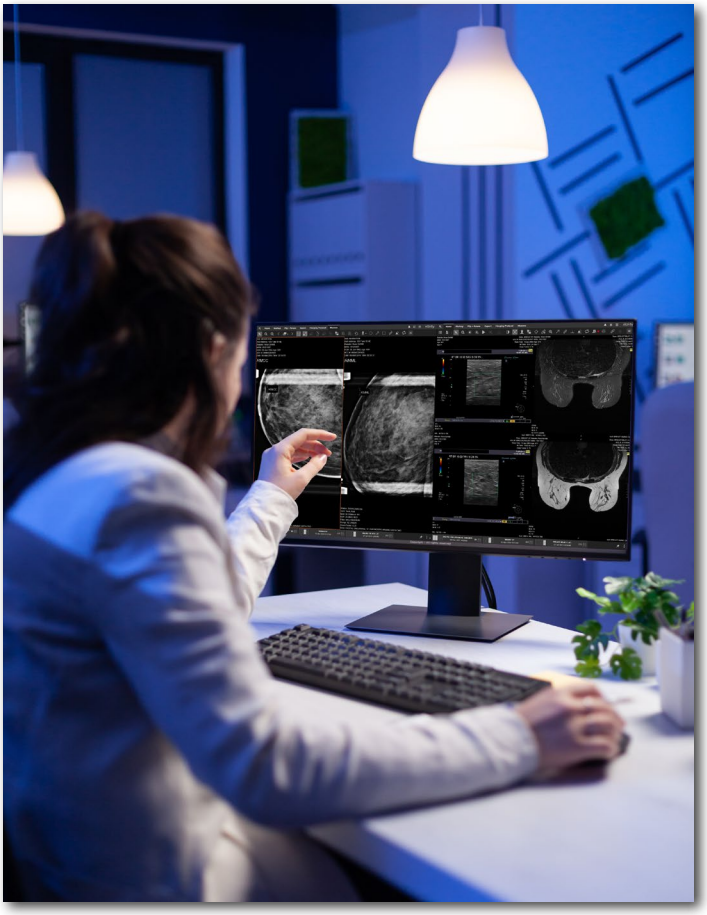
A key driver for cloud technologies in healthcare is the ability to enhance data aggregation and management by hosting patient and imaging data in the cloud with automatic syncing. This eliminates the need to query systems or workstations for updates. Once a cloud environment is established, connecting it to other cloud environments can further break down barriers to information flow, improving the availability and access to complete patient imaging records.

Such connectivity creates opportunities to improve efficiency, reduce costs, and enhance clinical outcomes. For instance, an intelligent system could be developed to create storage levels and enable clinical image lifecycle management, as well as read/write rules. A smart system incorporating tools to make decisions based on study type, retrieval frequency, and image compression ratios would provide substantial clinical value and support cost management.

From a clinical standpoint, essential aspects of a cloud strategy include promoting access to images anytime, anywhere, on various devices and in multiple locations, without dependence on individual workstation specifications or application licenses.

Adding role-based tools and capabilities further enhances the user experience and supports the increasing trend of remote diagnostic reading. **By providing immediate access to systems like picture archiving and communication systems (PACS), artificial intelligence (AI)**





applications, and digital dictation, without relying on network or workstation processing power, the cloud has the potential to transform current conceptions of medical imaging informatics.

Security and cost are central concerns in discussions about the cloud. Traditionally, hospital systems have used secure point-to-point communication between modality devices and their digital imaging systems (PACS) for imaging data transfer to support clinical and interpretive workflows. Organizations have dedicated significant administrative resources and operational investments to establish stable, secure, and performant networks and structures for these workflows, including investments in storage and archiving hardware often tied to proprietary third-party ecosystems. Current analysis of costs, security requirements, and other factors is leading organizations to move to the cloud, or at least to further research and investigate cloud adoption.

Cloud-Powered Enterprise Imaging in Healthcare

A discussion of cloud technology and imaging aggregation necessitates a discussion of **enterprise imaging**. While the definition of enterprise imaging is debated, I define it as the ability to access all imaging and patient data regardless of the acquisition source, location, or image type/format. In addition to access, enterprise imaging should free clinicians from computing requirements that restrict them to a specific workstation or location. The cloud offers significant benefits by providing a service that stores, manages, and seamlessly delivers data to clinicians within their normal workflow, irrespective of location or user device.

Ultimately, the goal is to optimize patient care. The transition to the cloud, combined with comprehensive access and availability of a

patient's medical and imaging history, centers the data around the patient. A true enterprise imaging model, where data follows the patient rather than requiring the patient to search for information in a fragmented system, would significantly improve the patient's experience, particularly regarding access to images and results.

For instance, the Chesapeake Regional Information System for our Patients (CRISP), a regional health information exchange (HIE) system in my healthcare network area in Maryland, stores and shares patient medical information to connect providers with technology to improve patient care.[2] Its mission is to enable and support the healthcare community in our region to appropriately and securely share data to facilitate care, reduce costs, and improve health outcomes. Similarly, cloud enablement and information sharing via the cloud can achieve a similar function by deploying health information technology solutions adopted through cooperation and collaboration. Over time, best practices and additional standards will evolve to serve the entire community or "enterprise." The cloud can facilitate this type of regional image sharing and cross-facility communication by using standards to collect various types of patient information from disparate facilities, healthcare entities, and sources, providing clinicians with a more robust and comprehensive view of each patient's healthcare journey.

Strengthening Healthcare's Future Foundation

I believe that the inclusion of all medical images in the electronic health record (EHR) will eventually become a standard requirement, accompanied by EHR regulatory rules for storage, lifecycle management, and access. Consequently, standards for information storage and sharing will need to build upon the foundational technology offerings from companies like **Mach7**. As mandates for the capture and access to multi-specialty imaging increase, healthcare providers will need to rely on their cloud and healthcare IT partners to ensure clinicians have a complete view of the patient's imaging history as a standard part of the medical record.

The question of how to curate patient data and consolidate it in the cloud to enhance patient care remains. Specifically, how will clinical workflows and technology be supported and managed by cloud offerings, and what implications will this have for enterprise imaging and its evolving definition?

I anticipate cloud innovation that aligns with the collective visions and product development horizons of healthcare IT providers. **Mach7's** unique expertise and history in developing software for the enterprise position the company as a catalyst for cloud transformation. Generally, imaging and informatics solution providers offering deployment flexibility and focusing on interoperability will be better positioned to assist healthcare organizations in supporting and adopting cloud services.

The utilization and adoption of the cloud will undoubtedly continue to grow. As healthcare professionals, we have a unique opportunity to guide this journey by facilitating information sharing and collaboration across the healthcare continuum. This will foster an environment of greater efficiency and higher performance, while reducing costs and ultimately enabling improved patient care and healthier outcomes.

Footnotes:

[1] *Signify Research Imaging IT Core Service World Report 2024*

[2] *https://www.crisphealth.org/about-crisp/*