



Cloud-Based Enterprise Imaging in Large Healthcare IDNs is the Key to Better Workflow and Cost Reduction

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INTRODUCTION

Since the mid 1990’s radiology has undergone one of the largest transformations in healthcare of any specialty. Radiology’s move from a film-based specialty transforming into one of the leading digital specialties in medicine was swift and necessary to keep up with increasing imaging demands brought on by aging populations, new modality introductions (such as MRI and PET), and better cross specialty collaboration. The transformation from film to digital also brought about new solutions to manage the digital revolution, such as Picture Archival Communication Systems (PACS). Not only were images able to be acquired and processed very rapidly, but workflow solutions were needed to capture, store, transmit, and display those images while improving radiologists’ ability to handle the increasing volume of images.

Today, this digital transformation continues to evolve, mainly around

Artificial Intelligence (AI) and Machine Learning (ML). However, other “ologies”, such as cardiology, digital pathology, wound care, ophthalmology, as well as other visible light technologies, have all moved to digital capture and workflows, but each initially had their own siloed way of storing, sharing, and displaying those images. Once again, our industry evolved to solve this siloed approach by embracing Vendor Neutral Archives (VNAs) and Enterprise Imaging Platforms (EI) to consolidate any image or clinical content captured from any digital device. Moving departmental solutions to enterprise platforms will also propel the adoption and growth of AI even further as in both large and small health systems, as AI will continue to improve plus start solving some very interesting workflow challenges organizations face daily.

The journey every healthcare organization will take as they evolve to embrace this digital transformation will be different, so let us explore why cloud-based

enterprise imaging and PACS solutions are the right choice for large IDNs to meet the future demands of healthcare, plus the benefits, recommendations, and challenges EI and cloud-based technologies bring as they evolve and transform to solve the daily problems organizations face to lower costs and improve patient outcomes.

PACS VS. VNA VS. ENTERPRISE IMAGING

PACS

With close to 700 million radiology studies acquired annually in the United States and over 4.2 billion performed worldwide[i], organizations are struggling with the best approach to manage all those images. When you add in the study volume from other imaging exams, such as cardiology, ophthalmology, dermatology, and other visible light

sources, those numbers grow even more significant. With radiology typically being the highest volume of images in a healthcare organization, PACS solutions were deployed to manage the digital revolution in properly managing the storage, display, and transmission of the radiology images.

As defined by Radiopaedia, a PACS is a modality of imaging technology which helps in image transmission from the site of image acquisition to multiple physically disparate locations. This technology not only is economical (film-less department), but also convenient to access multiple modalities (radiographs, CT, MR, ultrasound, etc.) simultaneously at multiple locations within hospitals or across the globe[ii]. A PACS solution provides a mechanism to store images captured at imaging modalities in the Digital Imaging and Communications in Medicine (DICOM) format, a method to transmit those images between various destination points (workstations), and the ability to display the medical images for reading on FDA cleared diagnostic imaging monitors. The software provides tools for the radiologist to manipulate the images, display them in their preferred viewing fashion, and compare them with similar historical images or images from other modalities.

The “A” in PACS, or archives, were designed to support the DICOM file format for image storage. Early systems initially wrapped radiology reports as well in DICOM – a practice that is still provided as an option in most storage solutions that support DICOM today. Over time, most PACS were able to support other files and store them in their native format (such as JPEG, MPEG, PDF, etc.). PACS solutions store the image data, DICOM header data (called metadata), and image pointers identifying where the images are in the storage architecture. These three components are managed and stored separately, so should the images need to be migrated, care must be taken to transfer all that data and ensure everything matches and the images are accessible in the new system the images are being migrated into.



Current challenges with PACS solutions include integration to other systems for data exchange (such as electronic health record systems, or EHRs), they are departmental by design, not enterprise focused, they are costly to maintain due to hardware reliance (they typically require high performance workstations, expensive diagnostic monitors, multiple servers to spread processing loads, spinning disc or flash storage drives, and periodic hardware refreshes), plus costly data migrations are required when changing PACS vendors. For some solutions, limited expansion and integration capabilities due to vendor lock-down on the radiologist workstations creates workflow bottlenecks or the need for multiple workstations in reading areas, increasing costs and impacting radiologist productivity.

VNA

Vendor Neutral Archives (VNA) are the backbone of any enterprise imaging strategy. The easiest definition of a VNA is a medical device that stores clinical imaging data in a standardized format and interface regardless of the proprietary system that created it. In other words, a system that stores data in such a manner that any system (or viewer) that uses recognized industry standards (HL7, DICOM, APIs, etc.) can access the information without requiring data translations.

Several of the greatest benefits that VNAs provide are:

- 1) Creating a standards-based, centralized storage infrastructure to provide enterprise access through EHR integrations for image enablement, and
- 2) Ensuring that organizations will no longer need to perform costly data migrations in the future.

Since the data is stored in a standardized, non-proprietary format, organizations can add enterprise viewers or change their PACS systems repeatedly without having to migrate their data again should they change vendors. This alone represents a significant cost savings since data migrations tend to be very costly. At InsiteOne, we have several customers who have changed PACS vendors multiple times without having to perform any data migrations during these transitions, which has saved our customers hundreds of thousands of dollars as well as not locking them into proprietary solutions. Furthermore, VNAs typically provide sophisticated lifecycle management options that allow organizations to meet compliance and legal initiatives that are required for the storage of their imaging data.

ENTERPRISE IMAGING

Enterprise Imaging Systems offer more flexibility in how they fit and adapt into an enterprise. These solutions have been designed to support enterprise workflows and management of virtually any data type from any modality (DICOM, JPEG, AVI, etc.). EI solutions provide a centralized backbone for a health organization to connect and store all imaging and multimedia data generated in a single location, eliminating silos of storage, improving overall cost structure, and providing enhanced system integrations within the EHR. The benefits? It significantly improves cross-departmental collaboration, along with consolidating costs and providing better integrations than traditional departmental solutions.

EI solutions are defined by the collaborative Health Information and Systems Society (HIMSS) and Society of Imaging Informatics in Medicine (SIIM) Enterprise Imaging Workgroup as “a set of strategies, initiatives and workflows implemented across a healthcare enterprise to consistently and optimally capture, index, manage, store, distribute, view, exchange, and analyze all clinical imaging and multimedia content to enhance the electronic health record.”^[iii]

EI solutions enable and optimize workflows and patient care by capturing, analyzing, AI-enabling, routing, prioritizing, fetching, viewing, integrating, managing, securing, reporting, exchanging, archiving, and governing clinical images, photos, and multimedia content from multi-ologies to enhance the electronic medical record (EMR). They also provide high-performing diagnostic tools to physicians to view, diagnose, offer insight, share opinions, and make informed patient-care decisions. As a patient centric workflow solution, they help dismantle silos of data and become the source of truth for any image acquired in a healthcare organization.^[iv]

Most EI solutions have VNA architecture at their core because archiving is a critical component of the enterprise platform. Enterprise Imaging adds much more robust workflow layers to support many different imaging workflows, advanced tag morphing tools, and sophisticated integration capabilities, on top of the VNAs centralized archive, and ensures data is stored in its native format to improve interoperability and access. Enterprise imaging adds to the VNA by encompassing an overall organizational strategy around how the images will be consolidated, tagged, stored, transmitted, and displayed throughout a given health system.^[v]



All the above technologies were introduced to the market based on the digitization that occurred in radiology. As the industry moved from film to digital, new mechanisms were developed to view, transmit, and store digital images, hence the widespread adoption of PACS in the early 2000s. As imaging volumes increased, organizations wanted to consolidate costs, to address this, vendors began offering combined archives for cardiology and radiology. Then as imaging began to take an even greater hold across other departments (dental, wound care, dermatology, endoscopy, etc.) the need to store virtually any clinical content (images as well as data) and embed it within the patient’s medical record (through EHR integrations) brought about the concept of the VNA. As the value of a VNA became more apparent, Enterprise Imaging solutions began to appear on the market, offering far better workflow orchestration at the enterprise level but still adhering to the standards that VNAs were built to provide.

But how does an organization realize the most value out of these solutions in today’s complex healthcare environment? New, emerging technologies, like artificial intelligence, are gaining in popularity and adoption, and healthcare organizations are beginning to realize that managing all this data cost effectively, will require new approaches to their long-term IT investment and infrastructure plans.

PACS, VNA, OR EI FOR INTEGRATED DELIVERY NETWORKS?

Integrated Delivery Networks (IDNs) are health systems that aim to integrate healthcare organizations with disparate missions and often fragmented systems. These networks include hospitals, physical therapy groups, health clinics, post-acute services, ambulatory surgery centers, and imaging centers and are organized in vertical integration.

Some IDNs also offer health insurance and are often

called “payviders”, since they are both a provider and a payer. Their main objective is to increase profitability for the health system and the payer while bringing a higher quality care to their patients, while reducing financial risks.

Integrated health services can develop strategic decisions to mitigate and reduce costs of chronic disease care while improving health care services. IDNs can use their vast network of healthcare providers to better coordinate patient care and deliver higher-quality services to different communities. Greater communication and collaboration between all health system levels can avoid network leakage and prevent revenue loss.[vi]



With greater communication and collaboration between all health system levels, IDNs are particularly suited to benefit from Value Based Care initiatives. Even more important, EI solutions are particularly well suited to IDNs because they align very closely with the overall goals of what IDNs are trying to achieve. Providing enhanced workflow capabilities and better access to all patient clinical and historical data through the EHR, opens the door to better collaboration, which improves the quality of care a patient receives. Better care planning leads to better outcomes which improves the cost of care.

Since IDNs are more integrated and have data centralized for enhanced caregiver access, they also are better suited to analyzing their data at scale or

THE VNA FIRST APPROACH

embarking on population health initiatives (solving chronic healthcare challenges within a population as a whole). Generally, IDNs grow through acquisition with other organizations that share their population regions or align on their patient care philosophies, and this often creates challenges early in the acquisition process. Since many of the hospitals they acquire may have their own PACS solution, the data must be migrated from those legacy systems into the EI platform of the IDN. EHR migration is also required to get every hospital and provider on the same EHR platform. The EI solution, many times, may have migration tools that can help streamline and lower the cost of these migrations plus allow the IDN to perform one or many migrations at any time, often without much vendor assistance (if they have the proper training and in-house expertise).

Why discuss IDNs with VNA and Enterprise Imaging strategies? Because these large organizations are very well suited to build strategies that centralize their data to improve care collaboration among their caregivers. Taking this a step further, many IDNs embrace value-based care initiatives, some even form Accountable Care Organizations (ACOs – groups of organizations and caregivers that work cohesively to provide elevated care and better coordinated treatments), as ACOs derive from value-based care initiatives. If you look at the goals of value-based care, these models replace traditional fee-for-service models of the past with models that place some responsibility on the provider to deliver optimal and improved outcomes for the patients they treat. In other words, part of the compensation they receive for the care delivered is tied directly to improved outcomes.

With costs of care escalating, payers and health systems needed better models to incentivize providers to provide optimal care to their patients and effectively share in the risk. Value-based care has many initiatives, but it can be simplified with the following goals:

- 1) Give the patient easy and efficient access to care in a timely manner (health equity),
- 2) Provide tools to caregivers and patients to facilitate greater patient engagement in their own healthcare and,
- 3) Care teams work seamlessly together to provide greater care coordination and higher patient satisfaction of the care being provided.[vii]



But how does value-based care tie to imaging and why is it particularly important within IDNs? When patients enter the healthcare system for care, they want providers dedicated to identifying their problem as quickly as possible and to provide the necessary tests and treatments that ensure the best possible outcomes in the shortest time possible – all at a favorable cost. Since imaging is increasingly being used in many care episodes, patients and providers need quick access to imaging tests and results in a manner that is easy to understand for both the provider and the patient. If multiple caregivers are involved in the patient's care, having access to all clinical data (including all images) to improve consultation and collaboration discussions is a must, any time and from anywhere. Centralized image management is critical for this collaboration, and when you add in every image acquired in a large health system to a centralized management solution, collaboration further improves, along with access to all the information on the patient. About 60% of data is missing from the EHR, but add in imaging and other clinical data, and now clinicians have access to more data that has traditionally been missing, giving them more information to make better decisions that leads to better outcomes, striking at the core of what value-based care strives to achieve.



IDNs still face challenges as they move to value-based care and there are a few areas where image consolidation, such as that brought by an EI solution, can help to solve. One of the challenges organizations faces is with system integrations. Multiple PACS systems and multiple EHRs do not offer cohesive workflows or access to data, so migrating data from those systems is imperative. If no action is taken, the overhead and effort to manage all the additional interfaces becomes quite costly. Ultimately, migrations must occur, and the data must be in industry standardized formats, so the data can be shared, analyzed, and mined from a centralized location. EI solutions provide the centralized storage architecture (and become all imaging's source of truth), then once the data is migrated and stored in its standard format, no more migrations should be required in the future. This simplifies interfacing, system integrations, and eases the support burden and on-going costs in the long-run, and ultimately provides a holistic view of the patient's data across the enterprise.

Another challenge IDNs face where EI solutions help to solve is improving employee burnout. Large health systems serve significant populations of people needing care, and the increasing volumes of our aging population often are blamed for straining staff and providers. EI solutions make accessing patient information in context with their medical record easier, lessening the burden on the provider to find the data they need to deliver optimal care. EI platforms also become the core for any AI strategy being undertaken, and using the right AI tools can maximize efficiency while easing the burden on staff, as well as, radiologists who are already overwhelmed, both from a clinical perspective as well as optimizing workflows by removing mundane or redundant tasks.

ADOPTING CLOUD-BASED PACS AND ENTERPRISE IMAGING

The recent COVID-19 global pandemic forced many care organizations to change how they deliver patient care. Virtual consultations, telehealth, staffing shortages, and remote monitoring all increased in popularity as the healthcare industry evolved to deal with delivering optimal care when social distancing was required.



Established technologies that existed before the pandemic but were not widely used in healthcare settings in the past started to grow in popularity. As infrastructure improvements continued to occur, cloud-based solutions began to see more traction in healthcare. Cloud computing began in the early 1960's when the Defense Advanced Research Projects Agency (DARPA) presented MIT with \$2 million for Project MAC. The funding included a requirement for MIT to develop technology allowing for a “computer to be used by two or more people, simultaneously.”[viii] Over time, as technology advanced, cloud computing only continued to grow in popularity.

Healthcare has lagged behind other industries in adopting cloud computing, like banking or ecommerce, for example. Much of the resistance comes from regulation regarding patient health information (PHI). Organizations face stiff penalties when patient data is breached under the Health Insurance Portability and Accountability Act (HIPAA). Organizations initially did not feel comfortable storing patient data outside of their organization due to the loss of control they would have over that data. Many times, those fears were probably unfounded since access control, data security, cybersecurity, backup strategies, and other considerations are often far more stringent with off-premises cloud providers than in many healthcare organization's own data centers. As we emerged from the pandemic, cloud technology began to increase in popularity to support virtual and remote workflows and patient care, and medical imaging is one area where cloud technology makes a lot of sense, especially in large health systems.

There are four types of cloud strategies most organizations typically consider:

1) **Health system owned data center** – the health system builds and staffs a full private data center. This is often an expensive approach since continual updates to the cloud technology, infrastructure, and staff training must occur. Health systems are in business to care for patients, not host data centers, so this is generally not the ideal choice for most.



2) **Public cloud** – cloud providers such as Google, AWS, and Azure are the leading providers. These organizations have taken specific care to ensure that their data centers are running on the latest technology, have the best possible security controls in place, package solutions by industry to help organizations get up and using the technology quickly, and are easily accessible. The downside to the public cloud is the cost of using these solutions. Storage may be cheap initially, but there are many hidden charges that, depending on how the data is accessed, can make these solutions very costly in the long run if accessing that data – or requiring more processing power, is required.



3) **Private cloud** – generally a cloud data center that is built and managed by companies that want to provide software and services for a specific industry. They are built by the vendors and have the same benefits as the public cloud, although many times, the vendor has a different cost structure, meaning that cloud fees may be more reasonable with a private cloud solution.



4) **Hybrid cloud** – this is the best of both worlds – especially when it comes to imaging. Hybrid solutions are just what one would expect; a minimal amount of compute and storage cache is located on-premises while long-term archiving is provided in the cloud data center (typically replicated across multiple data centers for backup and recovery). The benefit of a hybrid approach is data can be stored on-site for one-ten years (or more), with full copies in the cloud. Most retrieval of data will occur from the local cache, often significantly limiting the egress charges one would receive from public clouds when pulling data from the cloud data center. Hybrid solutions can be configured with private or public cloud providers. Hybrid solutions work well when it comes to radiology, since speed is an important factor for radiologists.



But is a cloud strategy for PACS and Enterprise Imaging a good idea for large health organizations (or even smaller organizations)? During the 2023 Health Information Management Systems Society (HIMSS) annual meeting this past April, according to an article in *Health Exec*, one of the biggest trends in healthcare informatics is the wider adoption of cloud data storage and a movement away from keeping all health system data in on-premises data centers. Healthcare systems are realizing there are benefits to not having to maintain ever-growing data centers, and the ability to refocus their health IT workers on mission critical patient care IT systems.[ix]

Cloud technology makes accessing data easier for everyone, including the patients, and this further helps fulfill the goals of value-based care, along with improved care and collaboration. Not only are cloud solutions becoming more widely adopted in healthcare, but their payment models can improve operational budgets. A Software as a Service (SaaS) model traditionally does not require a significant upfront financial outlay, spreading usage of the solution over the life of a contract, making these solutions part of an organization’s operating budget instead of capital budget. In many instances, healthcare organizations can access the technology faster while experiencing shorter implementation times, and there also is the benefit of not having to tap into capital budgets.



For enterprise imaging, the cloud is the best approach to take for any large or small health system looking to make a PACS change as there are many benefits to moving your imaging archive to the cloud. Cloud-based enterprise imaging addresses 360-degree longitudinal patient data and leverages analytics and AI/ML capabilities for more informed decision-making in the patient care journey.[x]

Benefits that cloud-based enterprise imaging provides include:

- **Universal imaging:** Image-enabling the enterprise through enterprise image sharing, viewing and collaborative tools.
- **Workflow optimization:** Leverage a unified VNA strategy to break down organizational silos.
- **Standardization:** Standardize imaging workflows and streamline multi-ology image management
- **Costs:** Improved total cost of ownership (TCO) and expenditure visualization.
- **Security and availability:** High availability and disaster recovery, cybersecurity, and data compliance monitoring.
- **Mobility:** Improved access, remote and mobile needs of users, including zero-footprint universal viewers.[xi]

Adding the benefits of cloud-based enterprise imaging with some of the more traditional benefits of enterprise imaging, such as those listed below, and one can quickly see the benefits an EI platform, and more importantly, a cloud-based EI platform, can provide.

- **Collaborative care and synchronization.** An enterprise imaging platform embedded with powerful clinical collaboration and synchronization tools can significantly enhance patient centricity and care personalization.
- **Cognitive intelligence and analytics capabilities.** An enterprise imaging solution with a built-in analytics engine can extract vital health information from complex, heterogeneous data sources while understanding unstructured clinical notes in the right context to identify high-risk patients and provide timely intervention.
- **Healthcare compliance and monitoring adherence.** A well-implemented enterprise imaging platform can store and distribute clinical contents in standardized healthcare data formats supporting all clinical ologies and reduce storage costs with information life cycle management tools and business continuity solutions coupled with disaster recovery.[xii]

Many healthcare organizations are working with outdated technology due to budget cuts, loss of revenue from the pandemic, mergers and acquisitions, or simply the need to invest in other areas to stay competitive. This has created a lot of legacy systems that are not modernized to meet the demands of today's changing healthcare landscape. As Archie Mayani, Chief Product Officer, Enterprise Imaging, Cloud Solutions for Change Healthcare mentioned in *Forbes*, organizations need to “pay off” their “technical debt”. Dealing with aging technology and infrastructure, healthcare leaders need to be more creative in finding solutions to modernize their tech stack to improve access to information, allow their care teams to work and deliver care from anywhere, to continue delivering the best care possible.[xiii]

CHALLENGES AND STRATEGY

Like any strategy you embark on, there is no “right” or “best” plan of approach. Every organization is different and will have their own priorities that drive decisions and form their imaging journey.

However, creating a solid enterprise strategy can help pave the path on your journey to a successful enterprise imaging initiative, such as:



- 1) Provide access to images throughout the enterprise to better enable collaboration and decision making that impacts patient outcomes.
- 2) Tie enterprise imaging to the Triple-Aim initiative – enhance the patient experience, improve population health, and reduce overall costs of care.
- 3) Understand all your clinical specialties, how they use imaging, and the specific and unique workflows they use in their normal day as it relates to imaging.
- 4) Tie your health care strategy to improving care quality initiatives and patient safety.
- 5) Spend some time analyzing your organization to show how an enterprise strategy can better impact the bottom line of IT and the organization in terms of reducing costs.
- 6) Map out specific, validated, patient journeys that show how enterprise imaging will improve the patient experience.
- 7) Provide examples of how an EI strategy will enhance the life of all caregivers in your organization.
- 8) Develop an enterprise imaging governance strategy. This includes processes and workflows, along with decision making processes and who will sit on this committee to make quick decisions.

9) Implement your EI strategy and be sure to connect it with your EHR.

10) Understand and strategize how you will address cybersecurity in your EI initiative. [xiv]

For more details around these steps, the HIMSS-SIIM white paper collaboration is a great place to start, as this series of white papers will help guide you as you plan and embark on your enterprise imaging journey ([Enterprise Imaging Community White Papers - Society for Imaging Informatics in Medicine \(siim.org\)](#)).



IMPLEMENTATION CONSIDERATIONS

Even with the best plans, when it comes to implementing a strategy, there will likely be hurdles you must overcome, such as workflow challenges you may have missed during your enterprise analysis. Having an EI committee to adhere to governance standards in your organization will help keep your implementation moving along since this committee should have the authority to act quickly and make important implementation decisions.

The following steps should help guide you on your implementation journey as you begin to roll out your EI solution and strategy:

1) Establish your enterprise imaging governance policies within your organization and begin a series of announcements to your caregivers about the changes you will be implementing in the foreseeable future. Be sure to include communications like new workflows and training opportunities so everyone can get on the same page, and they understand the phases you will go through on your enterprise imaging journey.

2) Determine which specialties will be the first to move to your Enterprise Imaging platform. Most organizations begin with radiology and cardiology, since the bulk of imaging within virtually every enterprise comes from radiology, but others choose to start with other ologies, such as digital pathology, wound care, dermatology, and ophthalmology. There is no right or wrong answer here, just choose a strategy and stick with it. The biggest key is to simply get started. Invest in a centralized architecture and develop phases to bring all imaging within your enterprise.

3) Begin your migration projects to transfer images from your legacy system archives to your new enterprise imaging infrastructure. If radiology and cardiology are not included in your first phases, be sure to begin sending new studies to the centralized archive to reduce migration efforts once you begin migrating those specialties in the future.

4) Communication is key. Be sure to continually communicate with your key stakeholders, administration, and your clinical staff to let them know the progress of your enterprise imaging initiatives. Keeping everyone well informed, along with any successes and potential delays, will help them understand the overall impact that your enterprise imaging strategy is having on your organization.

Common hurdles you may face (and your governance/EI team will need to deal with during implementation) as you implement your EI solution are many.

The following list is not by any means exhaustive but intended to show some potential areas to work through:

1) Make sure all imaging vendors you have in your organization can send images. If they cannot send outbound images (or retrieve them once they are sent), you will have to create plans on how to address this, including potential system replacement, upgrades, or delaying that department until a later phase in your journey.

2) Some imaging procedures will not use orders, yet it will be important for you to identify all images in your archive with a unique identifying number. You will need to develop workflows and strategies for dealing with imaging that does not traditionally require physical orders to perform and gain buy-in for new workflows that you need to develop.

3) Make sure it is very clear in your early planning phases who will own and manage the VNA. Will you have a dedicated team or opt for a vendor managed solution? Vendor managed solutions, like those provided by InsiteOne, allow the burden of IT management to be handled by the vendor, allowing your staff to concentrate on other critical IT initiatives.

4) Know that not all your historical data may be able to be migrated to your enterprise archive and be sure you have plans in place for how you will handle that situation.

5) Engagement with your vendors and clinical staff as soon as possible in your strategy development as well as your implementation will be critical for success.

6) Always focus on how your strategy will improve patient care and improve overall functionality without interfering with key departmental workflows. This needs to start early and often in your EI journey.

7) Make sure to address synchronization strategies and required integrations between your systems as you move through your implementation process.

As with any initiative, starting somewhere is usually the best approach. Although there are many factors your organization will surely need to deal with, let alone budgeting for such an important initiative, there are some suggested methods you can use to help you get the benefits of an enterprise imaging strategy while planning and paying for it over time.

The best place to start is to form your internal governance team and then define the objectives you want to achieve over the next 5 years and what “ologies” you will start with. Ensure the systems you want to move to your EI platform are adhering to enterprise standards, as this will speed up implementation and integration time once you begin your project.

Next, determine if your enterprise imaging strategy will be on-premises, in the cloud, or a hybrid approach. The hybrid approach may afford you with the best method which allows a large cache of images to be stored on site locally for the most rapid image access (especially considering radiology and cardiology workflows). All images will, of course, be archived in the cloud, and depending on which vendor you choose, you need to account for disaster recovery workflows should your local data center go down for any reason (such as how quickly can critical modalities be pointed directly to the cloud, bypassing your data center, to send images in the downtime scenario, and how will radiologists and physicians access those images? Also, does the cloud solution have the built in intelligence to re-sync studies with the local cache automatically when the data center comes back on-line?). Based on where healthcare is going and the need to keep up to speed with cybersecurity initiatives and provide continuous access to data, choosing a cloud-based infrastructure should be part of your strategy (all cloud models should support the future needs of your enterprise).

Beginning with archiving your data in your enterprise imaging platform will allow you to transition from an on-premises PACS to a cloud-based PACS, and this can be beneficial since your radiologists will be able to continue using the same diagnostic viewing applications. Moving to a cloud based PACS architecture will also open greater workflow considerations for off-site reading and providing after-hours support.

Finally, moving all your “ologies” to a cloud data center and integrating those images within your EHR provides the best possible ability for cross-department collaboration. Your clinicians will have access to all imaging data in the context of the patient’s medical record. Once you move everything to the cloud, you can shut down the disparate silos of imaging data as they will no longer be needed within your organization, saving you time and money.



On your journey to enterprise imaging, you are sure to begin working with AI in your organization, if you haven't already. AI continues to be very promising in providing medical insight into images, as well as providing enhanced workflows that will allow your clinical teams to work smarter, faster, and more efficiently than in the past. AI and cloud computing are natural companions and are driving a new revolution in healthcare that we haven't seen for decades. Your cloud-based enterprise imaging strategy is a perfect strategy for adopting AI within your organization. Cloud-based solutions allow you to provide more advanced workflows and scale across your enterprise faster and easier than in the past, and this approach does not lock you in to limiting your future expandability as needs change and new AI technology becomes available. Your cloud-based EI solution will be the foundation to launch your AI initiatives and enjoy the benefits AI is sure to deliver.

With proper planning, communication, and with a strong governance strategy, your implementation of an enterprise imaging platform will provide you with a smooth transition from a siloed, departmental approach to an enterprise approach aimed at improving overall operations, workflows, and ultimately, enhanced patient care.

FINAL THOUGHTS...

Enterprise Imaging is the wave of the future. Getting off to a slower adoption rate than originally expected, EI is gaining more traction now that we have emerged from the pandemic, simply due to the increase in imaging volumes. Today, more organizations than ever are considering EI strategies over departmental replacements when systems are in-line to be replaced. Cloud technology provides the platform to scale up or scale down with ease, no longer burdening IT staff with the workload or budget constraints of the past. Preparing your EI strategy to incorporate cloud technology is no longer a luxury, but an absolute requirement to provide unlimited expansion and scalability as your needs evolve. Cloud EI solutions are also great platforms to adopt AI within your organization and become the core platform for your AI initiatives.

Other imaging "ologies" are evolving to digital as well and need to be part of your strategy, such as digital pathology. Although digital pathology is a bit further ahead in Europe, it's gaining widespread adoption now in the US, and proper planning now, will prevent future mistakes, like deploying another "siloed" departmental solution requiring a future migration to your EI platform.

Consolidation and centralization of all your images opens opportunities to dig into population health initiatives quicker and easier than in the past.



Integrating data analytics tools into your EI platform offers data analysis and comparisons not available with siloed systems. As AI gains popularity in clinical trials and drug development, consolidated data that is easily searchable and available to researchers provides opportunities to enrich the data (imaging data with historical information, medical record data, radiomics and genomics data), improving the data's value to be used in clinical research or drug development and for precision health initiatives. Enriched data opens the door for new revenue streams but also advances healthcare, providing a real opportunity to further reduce costs and significantly improve patient outcomes.

Enterprise Imaging is no longer a "nice to have" strategy, it's a requirement. With proper planning, solid governance, and strong buy-in from your leadership, you will position your organization to be at the forefront of where healthcare is going and have the tools to help you get there faster, at scale, and with lower costs, and that's a winning strategy for any organization.

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