Enterprise imaging: See what you've been missing

Tearing down medical imaging silos for better clinical visibility and outcomes

HYLAND™

Contents

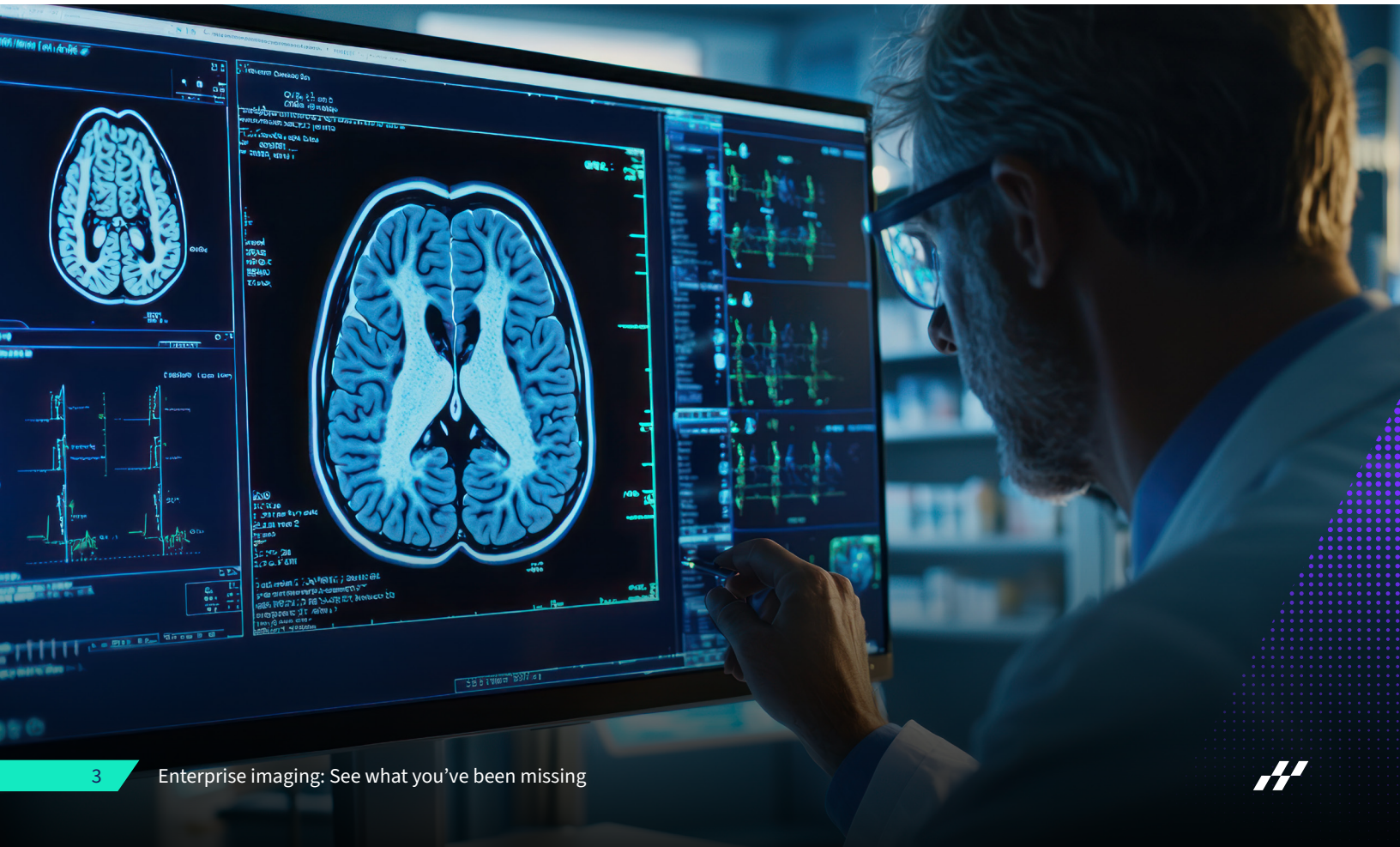
Introduction

Patients at the center

Today more than ever, with the advances in healthcare technology, clinical providers have access to more data and insight into a patient's health record. Having the right consolidated access helps clinicians diagnose, monitor, treat and even prevent illness with optimal accuracy and effectiveness. The problem occurs when crucial images and data are trapped in departmental silos that aren't easily or consistently connected to core clinical systems. As a result, they often aren't considered by physicians or imaging specialists during patient assessments, which can impact the quality of care. This can increase expenses in care and affect patient outcomes.

In today's patient-centered healthcare environment, achieving better outcomes and reducing costs, such as unnecessary and duplicate imaging, requires that all clinical stakeholders have timely access to more robust data — including all medical imaging types, regardless of source and department.[1]

Enterprise imaging enables more informed clinical decision-making by allowing healthcare organizations to connect, manage and access medical images for a holistic view of the patient. Consolidating imaging information throughout the organization with enterprise imaging solutions enables seamless communication with all IT systems, significantly enhances workflows and allows organizations to achieve the Triple Aim goals of improving costs, quality and the patient experience.



Defining enterprise imaging

What's in the name?

The term "enterprise imaging" is used a lot today by many different people in healthcare, but what exactly does it mean?

There are those who define it as the sum of the technology — that is, a vendor neutral archive (VNA), an image viewer and an image-enabled electronic medical record (EMR). But for others, it's more of an approach. For example, the HIMSS-SIIM member workgroup has defined enterprise imaging 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."[2]

In truth, it's both and then some.

Enterprise imaging is about more than just image-enabling the EMR; it's about imageenabling the healthcare ecosystem. It begins by capturing and managing both DICOM and non-DICOM images, making this information viewable to all clinical stakeholders, even when access to the EMR is not available. As such, it is a solution that supports the entire healthcare ecosystem.

Enterprise imaging is about more than just image-enabling the EMR; ***it's about image enabling the entire enterprise.***

PACS technology limitations

PACS systems were designed to support DICOM workflows and thus were considered a departmental solution for reading. These systems became the de facto solutions for archiving and managing the radiology and cardiology images based on the DICOM standards developed nearly 40 years ago. However, the imaging world today has evolved to include other types of images that also provide diagnostic and referential documentation. These images include native JPEG and TIFF files and MPEG videos that are captured in several areas throughout a health system including but not limited to:

- **Ophthalmology drawings and images**
- **Gastroenterology "visible light" videos and images**
- **Dermatology photos**
- **Pathology slides**
- **Genomics data**
- **ED/OR/surgery photos and videos**

Given the ever-increasing image volumes and types entering today's healthcare organizations, many clinical leaders are beginning to recognize the limitations in PACS when trying to extend that technology across the ecosystems.

- Limited storage
- Integration issues with other hospital systems and PACS from different vendors
- Problems viewing and importing of images and data
- Issues with migrating data, backup, archiving and recovery
- Difficulty transmitting images

“

I have an “-ology” problem. Radiology, cardiology, pulmonology, gastroenterology, gynecology and endocrinology all have image management needs that require high-bandwidth networks; short-term, high-speed storage; and long-term archival storage.[3]

The needs and technology have changed, and PACS wasn't designed to provide the connectivity and information sharing needed across the healthcare system or the capability to work with a variety of formats that are interoperable with EMRs and other downstream systems.

The proprietary nature of some PACS also makes it difficult for healthcare providers to be agile enough to change their business operations quickly. This capability is becoming increasingly important in light of the growing merger and acquisition (M&A) activity occurring in the sector. This is why many PACS vendors partnered with VNA vendors to augment their technology. Fluid transitions require true data ownership that inherited, disparate PACS simply don't provide. Finally, PACS technology is known for driving high-cost data and image migrations. As PACS become outdated and need to be replaced or when a new PACS is added, data migration — the process of extracting, translating and loading data from one source (legacy archive) to another source (destination archive) — is needed. This time-consuming process can be costly from both an expense and resource standpoint. This should be a key consideration as organizations make enterprise imaging decisions. For example, when a radiology department decides to change or upgrade their PACS, a traditional archive strategy, including conversion, migration and project management, costs organizations on average $2.84 million.[4] VNAs provide the infrastructure and platform to easily manage imaging across the environment.

As organizations begin to think about their enterprise imaging strategies, it doesn't mean a rip and replace of all your PACS systems. It does mean thinking about the bigger picture that supports your overall strategy in providing interoperability of imaging data throughout your ecosystems.

PACS 5-year cost of ownership=

$2.84 million

Traditional archive strategy, including conversion, migration and project management.[4]

The solution: An enterprise imaging strategy

Enterprise imaging provides the needed infrastructure for healthcare organizations to accomplish these goals by eliminating the inefficiency, complexity and roadblocks that prevent access to the medical image content and information needed to drive more informed care decisions.

Many organizations struggle to implement an effective enterprise imaging solution. Those that have been successful have taken a more holistic view of their ecosystem. Achieving an overall enterprise imaging strategy is no small task, and many organizations take an incremental approach to minimize disruptions in care and workflows. Using a three-pronged strategy can help organizations better prepare and have greater success when it comes to enterprise imaging:

1

Connect

Capture and integrate all medical imaging content types — including DICOM, XDS and multi-media images (non-DICOM) — with existing EMR and imaging archives until your imaging platform implementation is completed.

2

Manage

Eliminate departmental silos and manage imaging content from all "-ologies" in an imaging platform with a VNA.

3

View

Access, exchange and interact with medical images from anywhere with a zero-footprint enterprise diagnostic viewing solution.

Let's take a closer look at each of these vital components that make up an optimal enterprise imaging solution.

Unlock your imaging data

Image capture and acquisition

Medical images are acquired in many settings throughout healthcare facilities, making image capture and acquisition a critical need that creates a better patient experience and streamlines workflows for clinicians providing care. Specialty images such as endoscopy video, surgery videos, dental ophthalmology and dermatology photos are usually stored in isolated departmental systems. Images can also be stored on CD, DVD, USB devices and even on smartphones, tablets and other mobile devices throughout the enterprise. Up to 80% of patient content is primarily unstructured in nature, existing as objects, which makes it difficult to access and does not become part of the patients comprehensive imaging record.[5]

When starting the enterprise imaging journey, a thorough audit of the entire medical image environment is needed to determine the image acquisition and image location repositories. Once that is done, then technology can be put in place to facilitate capture and acquisition that will route these images from their acquisition locations to an enterprise imaging platform. Enterprise imaging provides an end-to-end solution to automatically capture, integrate and share documents and images across departments, eliminating the silos.

When considering a solution, organizations should look for one that not only offers capture and acquisition capabilities but also provides intrinsic connectivity tools to ensure interoperability.

Up to 80%

of all patient content is unstructured.[5]

Vendor Neutral Archive — imaging platform

With images stored in various departments throughout an enterprise, and often with each imaging system speaking its own language, the result is proprietary information locked in isolated archives, making interoperability, information sharing and image-enabling the patient record a challenge. It's difficult, if not impossible, to access them when they are most needed — in the decision-making process at the point of care.

A VNA is a powerful imaging platform that eliminates data silos and provides consolidated storage and standardized management of medical content and images, regardless of their origin or native format (DICOM, XDS, TIFF, JPG, MPG, AVI, GIF, etc.), that communicates seamlessly and transparently with healthcare IT systems, making information readily available. The VNA provides an essential foundation for efficiently delivering a comprehensive imageenabled view of the patient that's centralized and easily accessible to better support care decisions.

A VNA imaging platform has multiple benefits:

- Eliminates vendor lock and block
- Creates flexible storage architecture
- Integrates with enterprise applications
  - Maintains interoperability across disparate IT applications while supporting individual departmental workflows and preferences
- Is cloud-ready
- Serves as an enterprise management tool
  - Reduces costs with an economy of scale by consolidating hardware and software purchases and maintenance into a single imaging archive, making the most of capital equipment budgets and human resources
- Leverages built-in data migration tools for storage systems, apps and refreshing of metadata content
- Avoids costly PACS data migrations
- Supports image exchange
  - Associates shared images with the appropriate patients across IT systems, health information exchanges and unaffiliated providers

“

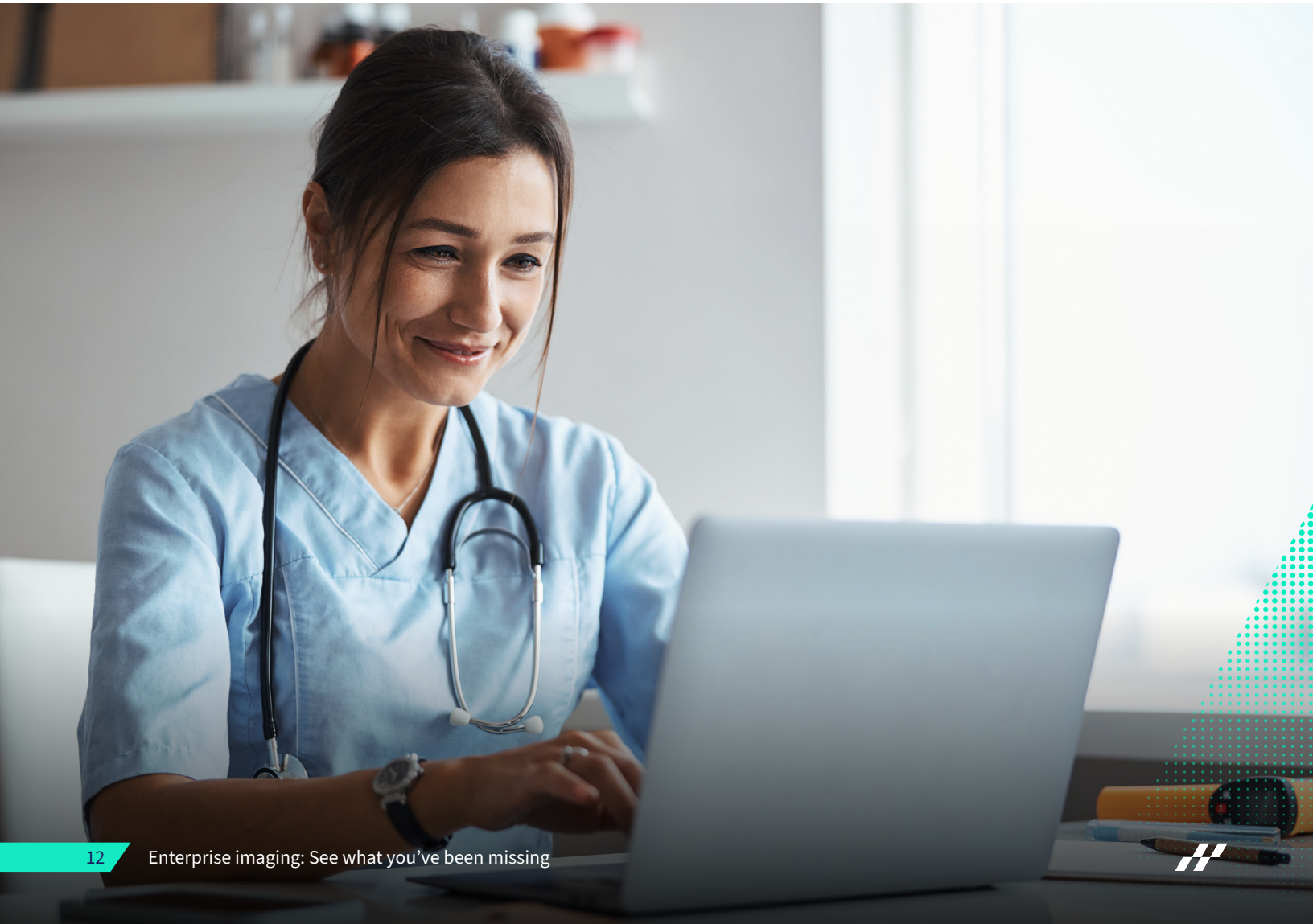
The VNA gives the organization all of the data management tools required to build the complete longitudinal patient medical image record, including both structured (DICOM and non-DICOM images) and unstructured data, thus replacing many individual disparate data repositories and viewing applications.[6]

Augment PACS with a VNA

While PACS has its limitations, most healthcare facilities have invested millions in making this technology the center of all medical imaging operations. Therefore, it's not only uneconomical but unwise to simply abandon PACS altogether. The good news is an enterprise imaging approach can augment your existing PACS environment for the short term while you implement your long-term strategy.

Technologies such as a VNA provide an excellent bridge, offering flexibility and scalability to reap the benefits of technology advancements. Simply put, a VNA can help PACS address larger institutional challenges around interoperability and information sharing. That, in turn, can simplify the transformation path to patient-centered care and population health while easing transitions when further acquisitions and/or new partnerships take place.

Much like enterprise EMRs have replaced clinical point systems for departments like Laboratory, Pharmacy and ER, **Enterprise Imaging can (and should) do the same for imaging silos.**



Enterprise viewing

In healthcare organizations today, medical images are all too often left out of the decision-making equation because it's either too time consuming to locate them, or they simply can't be found. In fact, 35% of a clinician's time is wasted due to the lack of interoperable systems.[7] That's why implementing an enterprise diagnostic viewer is such a vital step in the enterprise imaging journey; it allows viewing of any medical image, imaging report and related patient data anytime and anywhere.

With an enterprise diagnostic viewer, digital image access is no longer confined to the department that created the data. This platform empowers physicians to view and interpret any image, along with patient content, in any format across the enterprise. Such a viewing solution may replace or coexist with a traditional PACS viewer and is integrated with a VNA or EMR.

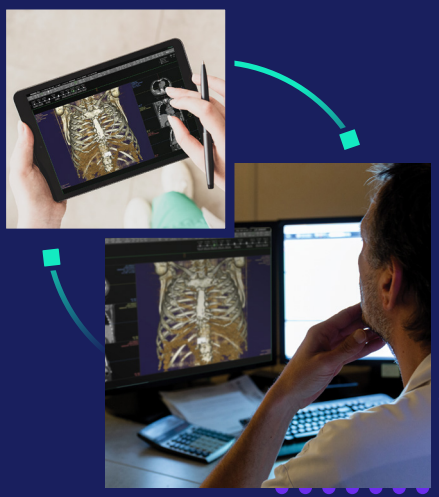
Finally, an enterprise diagnostic viewer should do much more than simply provide referential viewing for clinicians at the point of care. The right enterprise viewer will also deliver options that provide robust diagnostic and interpretation capabilities so that radiologists or other interpreting specialists can perform many of their job functions without having to be physically tied to a PACS workstation. With on-demand access to patient images and reports, radiologists and clinicians can realize faster diagnoses, therapy decisions and superior patient care.

Enterprise diagnostic viewing technology supports a variety of important use cases. These include:

- Image viewing across the enterprise
- Image-enabling the EMR
- Image-enabling patient portals
- Remote diagnostic and interpretation capabilities for radiologists
- Cross-enterprise image sharing for collaboration and second opinions
- Enterprise-wide image sharing for trauma transfers and other emergency cases, enabling decision-making on a case before the patient is transferred
- Referring physician image access, typically through a physician web portal
- Image viewing across a health information exchange

35%

of a clinician's time is wasted due to the lack of interoperable systems.[7]



Realizing value

Better patient outcome

Enterprise imaging improves patient care outcomes by providing a holistic view of patient records and streamlining workflows for better point-of-care interactions. Online collaboration, including the ability to analyze and share measurements and notes, helps radiologists and other specialists communicate and work more effectively as part of the patient care team.

Ways enterprise imaging impacts patient outcomes:

- Supports clinical decision-making at the point of care
- Improves patient safety
- Streamlines care coordination and collaboration
- Provides patient access to their own health information

Case in point

A real-world example of how an enterprise imaging approach improves patient outcomes is evident at Vanderbilt University Medical Center (VUMC). Using an enterprise diagnostic viewer, VUMC has been able to share complex CT scans and MRI images in real time for remote neurology consults. In the past, when patients presented with stroke symptoms at affiliate healthcare facilities, on-site neurologist availability was limited, resulting in a nearly 100% transport rate to VUMC. A high percentage of these patients, however, had not experienced a stroke. This situation resulted in unnecessary bed usage at VUMC and impact on resources. Since the teleneurology program began with image exchange via the enterprise diagnostic viewer, patients have received faster access to specialists for stroke diagnosis, and stroke patient transfers to VUMC have been reduced to 12%. The referring facility is now able to treat patients locally, keeping them close to family and familiar caregivers and, in turn, better resource management, enabling VUMC to preserve beds for patients with more severe cases.

Using near-real-time image exchange via an enterprise viewer for neurology consults, Vanderbilt University Medical Center was able to establish a Teleneurology program that helps provide patients around the region with faster access to specialists for stroke diagnosis.

Ensure data security

Technology is swiftly changing. From ongoing system updates to new platforms such as the cloud, migrating data is a vast problem, especially for outdated silos. Without the right system to manage these images, an organization faces the risk of unsecured, untracked, unmanaged and redundant content across the organization.

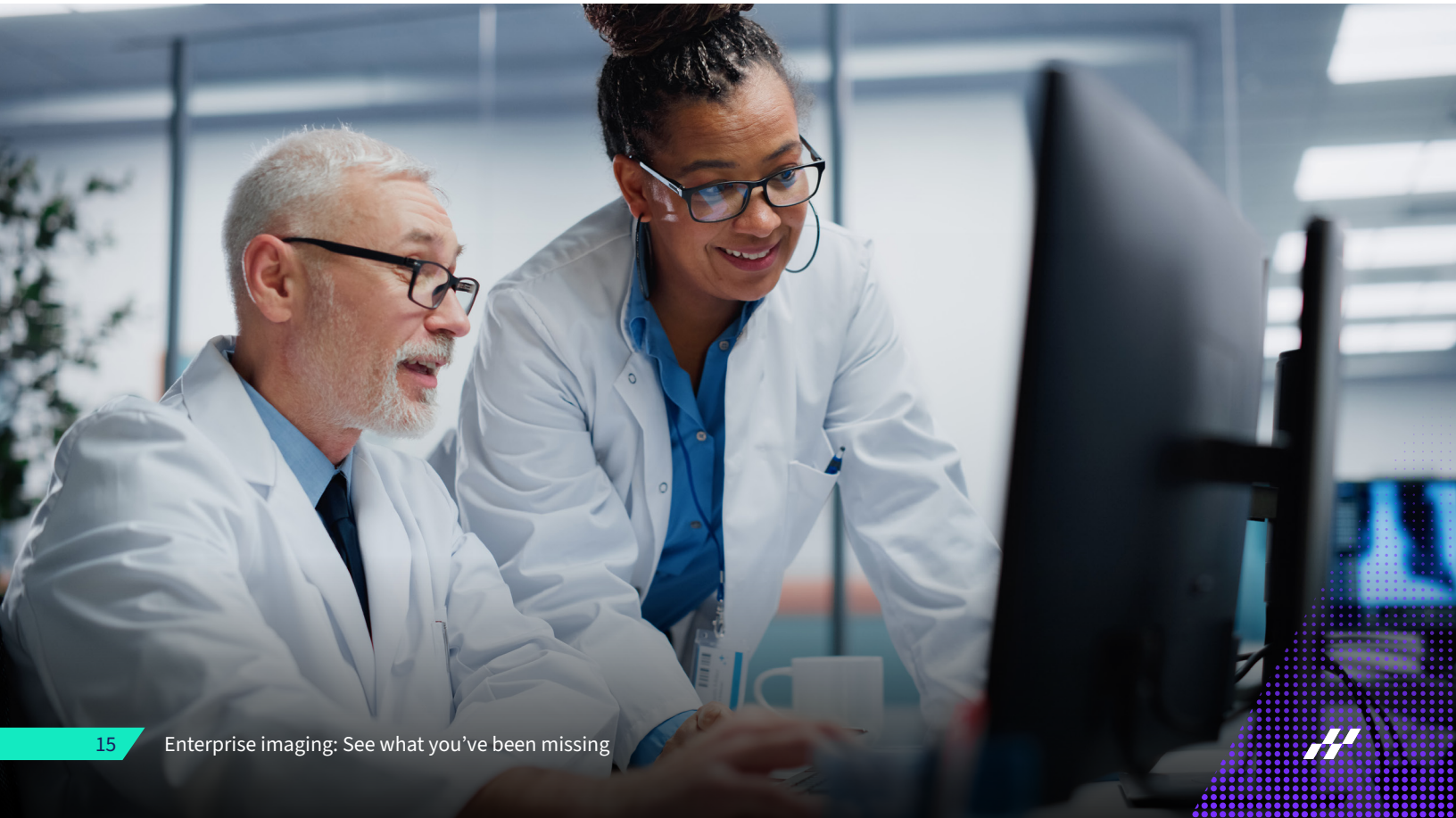
An enterprise imaging solution that is truly vendor neutral and standards based and adheres to DICOM and HL7 as well as IHE and XDS framework provides the best imaging strategy for short and long-term goals. An imaging solution:

- Ensures data security and HIPAA compliance by getting images off hard drives, disks and USB drives
- Establishes centralized control of imaging data, making it easier for healthcare IT to universally apply security protocols (disaster recovery plans, encryption, etc.) to all images
- Protects PHI from unwanted exposure and allows sophisticated rules for the most sensitive patient data

Case in point

During an enterprise imaging audit, Children's Hospital of Philadelphia (CHOP) discovered that it had 21 different image acquisition and viewing solutions (e.g., PACS viewer, ultrasound application viewer, image sharing application viewer and enterprise viewer) in use throughout the hospital and 10 disparate image storage solutions. "There was a lot of storage we knew about, but there was also a lot of storage we didn't have insight into such as memory cards, shared drives, local hard drives and smartphones with cloud storage," says Andrew Longoria.

PACS/radiology informatics manager at CHOP. "This was a concern from both a clinical and data security standpoint." CHOP implemented an enterprise imaging strategy that incorporated a VNA and enterprise diagnostic viewer for image consolidation and viewing via the EMR. Centralizing imaging data allowed the provider to eliminate disparate imaging silos and ensure that all data was governed by the same security protocols.



Lower costs

Like other businesses, hospitals must enhance the customer experience, improve quality and reduce costs to remain viable in today's highly competitive markets. Enterprise imaging can help healthcare organizations optimize financial performance in a number of ways.

Enterprise imaging helps control costs by:

- Reducing redundant testing
- Lowering hospital readmissions with imaging workflows that provide real-time access to images and information
- Increasing workflow efficiency and clinical productivity
- Eliminating costly PACS data migrations and departmental system maintenance
- Facilitating an integrated central point for all images, providing savings over departmentally siloed imaging solutions
- Creating an ecosystem of interoperability for better collaboration

Case in point

Piedmont Healthcare provides a small taste of the type of cost savings a healthcare organization can enjoy by adopting an enterprise imaging strategy. Since implementing a VNA, the provider has saved more than $700,000 and expects an additional $2 million to $3 million in savings as it moves over additional PACS to the enterprise imaging model. These savings are largely a result of reduced maintenance and data migration costs.

Since implementing a VNA, Piedmont Healthcare has saved more than

$700,000

and expects an additional $2 million to $3 million in savings as they move additional PACS over to the enterprise imaging model.

Operational efficiency

Enterprise imaging makes data readily available to clinicians across the enterprise. It brings together images from all departments, hospitals and modalities and makes them available across the enterprise and beyond the four walls, thereby increasing efficiencies.

To realize these gains, the solution should support:

- Imaging governance
- Life cycle management
- M&A transactions
- Workflows and productivity
- Data ownership
- Ability to ingest newly acquired assets and bring into standards

Case in point

An example of an enterprise imaging approach improving operational efficiency is evident at UNC Health Care. Prior to implementing a VNA as part of an enterprise imaging strategy, the provider had 32 radiology and cardiology PACS in use as well as multiple specialty and point-of-care imaging systems. Clinicians had difficulty finding the medical images they needed to associate with the patient record. With the VNA, all patient images — DICOM and non-DICOM visible light images — are centralized in a single repository and accessible via UNC Health Care's EMR, streamlining clinical workflows, simplifying collaboration and maximizing productivity

> We wanted to create a seamless image viewing experience for our physicians, so that it didn't matter if a doctor was looking at a patient image in our community hospital or our main academic campus. Regardless of his or her location, we wanted that doctor to be able to view the same image, access the same toolset and retrieve the same longitudinal patient record.

Vineeta Khemani
Director of Information Services and Clinical Systems, UNC Health Care

Conclusion

From vision to reality

Advancements in medical imaging technology provide today's clinicians with more detail, clarity and insight into patient health than ever before. However, locating and accessing medical images is difficult for most healthcare systems and hospitals. Medical images are often scattered across the organization in various formats and stored in disconnected systems. Achieving order among the chaos is possible. Enterprise imaging can provide a solution to support clinical decisions at the point of care with standard capture, image management and viewing capabilities.

Evaluating an enterprise imaging solutions and course of action for your organization can be a daunting task. The strategy presented in this ebook is designed to give insights on the vital components of an enterprise imaging solution. It outlines three pillars of the solution that organizations can use to think through how to connect, manage and view medical images across the ecosystem. As organizations walk through this process, they should think of it as a journey. Each pillar can serve as a giant step forward by taking well-thought-out steps to embarking upon a successful enterprise imaging solution that will drive greater operational efficiencies, improve patient outcomes and reduce costs for years to come.

At Hyland Healthcare, we help you to see what you've been missing. We can help you connect, manage, view and share patient data when and where it's needed. Eliminating medical imaging silos with a connected solution gives a complete picture of the patient to better support care decisions and improve outcomes.

Additional resources

Learn more about Hyland Healthcare enterprise imaging with these additional resources.

Customer success story:

UNC Health

Customer success story:

Medical Center

Learn more at Hyland's enterprise imaging solutions.

Sources

1 Bridget A Stewart, Susan Fernandes, Elizabeth Rodriguez-Huertas, and Michael Landzberg : May-Jun 2010, JMIA 17(3): 341–344, "A preliminary look at duplicate testing associated with lack of electronic health record interoperability for transferred patients".

2 Christopher J. Roth, Louis M. Lannum and Kenneth R. Persons, "A Foundation for Enterprise Imaging: HIMSS-SIIM Collaborative White Paper," May 2016.

3 John Hamalka, "Dispatch from the Digital Health Frontier," 2008.

4 AuntMinnie.com, "Vendor-neutral archives can save money, add efficiency," 2013.

5 Data Management Solutions Review, "80 Percent of Your Data Will Be Unstructured in Five Years," 2019.

6 Michael Gray, "The Anatomy of a Vendor Netural Archive (VNA) Done Right: The Case for Silo Busting," 2011.

7 West Health Institute, "The value of medical device interoperability," 2013.