# ENTERPRISE IMAGING: See what you've been missing

Tearing down medical image silos for better clinical visibility and outcomes

Hyland®

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# Introduction

## PATIENTS AT THE CENTER

Advancements in medical imaging technology provide today's physicians with more detail, clarity and insight into patient health and outcomes than ever before. These sophisticated images help clinicians diagnose, monitor, treat and even prevent illness with optimal accuracy and effectiveness. The problem is these crucial images are often 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 seriously impacts the care quality they are providing. This also drives up expenses as it results in duplicate or unnecessary imaging which costs the U.S. about $12 billion annually.* In fact, 32 percent of duplicate tests occur due to lack of information sharing.**

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 medical images contained in picture archiving and communications systems (PACS) and other specialty department legacy archives that store non-DICOM medical images and video, such as JPGs, PDFs and MPGs.

Enterprise imaging enables more informed clinical decision-making by allowing healthcare organizations to connect, manage and view medical images both at the clinical point of care and within the radiology and cardiology departments. Consolidating imaging information throughout the enterprise into a single, standards-based and vendor-neutral image repository that communicates seamlessly with all IT systems significantly enhances workflows. Furthermore, it enables organizations to achieve the Triple Aim goals of improving costs, quality and the patient experience.

* (Source: Unnecessary Imaging: Up to $12 Billion Wasted Annually, Peer 60 Smart Data Report, 2014)

** (Source: 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")

# 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 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."*

*In truth, it's both and then some.*

Enterprise imaging is about more than just image-enabling the EMR; it's about image-enabling the entire enterprise. It does this by capturing both DICOM and non-DICOM images as well as unstructured data and making this information accessible to all clinical stakeholders, even those who may not have EMR access. As such, it is a solution that supports not only the EMR but also a whole host of enterprise systems, including population health analytics, PACS and specialty departments.

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

* (Source: A Foundation for Enterprise Imaging, HIMSS-SIIM Collaborative White Paper, May 2016)

# PACS technology challenges

While adoption of patient-focused information systems have helped meet some of the evolving demands of healthcare, most clinical IT systems were not built with the goal of supporting a connected healthcare ecosystem that would offer a complete picture of a patient's total health experience. Traditional healthcare IT solutions, including PACS, continue to manage and store patient information using proprietary formats, despite the availability of standards. This makes sharing patient information within and beyond enterprise boundaries an almost impossible problem to solve.

## SILOED

Traditional PACS approaches don't easily extend images to point-of-care clinicians and don't typically manage clinically valuable non-DICOM medical image formats (JPG, MPG, PDF, etc.) without extensive DICOM wrapping and hefty fees from the PACS vendor. As a result, this information often remains locked in silos, largely inaccessible to the enterprise.

## PROPRIETARY

While traditional PACS utilize the DICOM industry standard, they have all built "value-added extensions" that essentially result in proprietary code sets that are unique to a chosen vendor. These proprietary solutions can make image sharing within and outside the enterprise complicated and costly.

Timely access to critical clinical images that sit outside radiology and cardiology further complicate the silo effect. This images include, but are not limited to:

**Ophthalmology drawings and images**

**Dermatology photos**

**Genomics data**

**Gastroenterology "visible light" videos and images**

**Pathology slides**

**OR/surgery photos and videos**

> I have an "-ology" problem. Radiology, Cardiology, Pulminology, Gastrology, Gynecology and Endocrinology all have image management needs that require high-bandwidth networks; short-term, high-speed storage and long-term archival storage.*
>
> **John Halamka**
> *Life as a Healthcare CIO*

* (Source: Life as a Healthcare CIO blog).

More than two-thirds of healthcare enterprise IT budgets are devoted to maintaining existing infrastructure.* PACS is 20-year-old technology that fails to meet many of today's imaging objectives. It simply wasn't designed to provide the connectivity and information sharing needed across departments, or the capability to work with a variety of formats that are interoperable with other PACS, EMRs and downstream systems. The technology also fails at consolidation of disparate IT infrastructure and true data standardization. This escalates expenses since each system must be individually maintained.

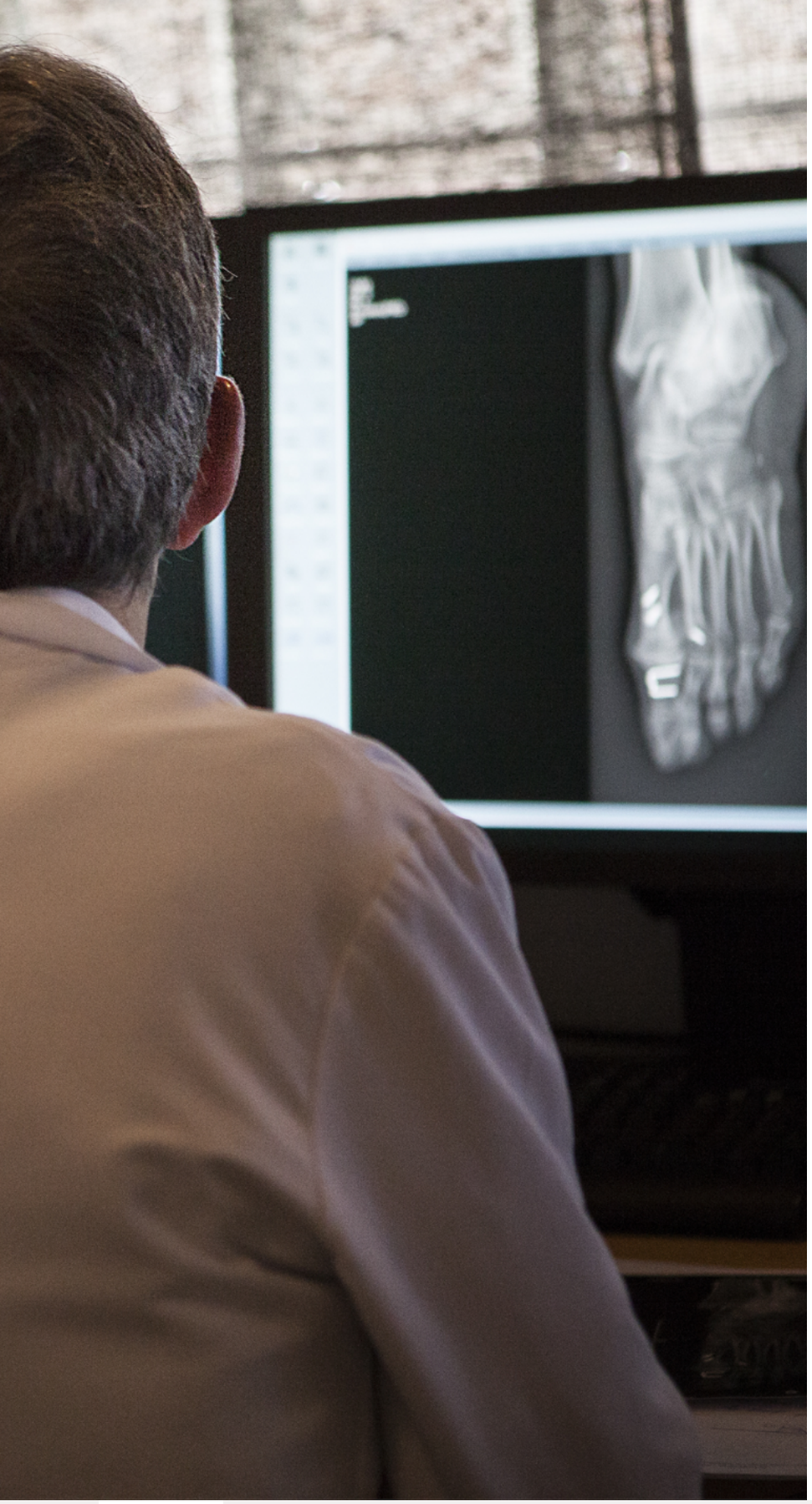
The proprietary nature of PACS also makes it difficult for healthcare providers to be agile enough to change their business operations quickly. This capability is becoming increasingly important in light of the growing merger and acquisition activity occurring in the sector. Fluid transitions require 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 is a time-consuming process that can be very costly from both an expense and resource standpoint and should be a key consideration as organizations make enterprise imaging decisions. For example, radiology departments tend to change PACS about every five years. This traditional archive strategy, including conversion, migration and project management, costs organizations on average $2.84 million.**

> ***PACS 5-year cost of ownership = $2.84 million***
>
> *Traditional archive strategy, including conversion, migration and project management.***

To truly deliver patient-centered care, healthcare organizations must gain true ownership of their imaging data by removing the vendor lock and block that exists in PACS environments. They must shift from departmental views of medical images to a single, enterprise view that makes all images accessible across the organization.

* (Source: AuntMinnie.com. "Vendor-neutral archives can save money, add efficiency." March 20, 2013.)

** (Source: Sectra White Paper; The Children's Hospital of Philadelphia)



# The solution: an enterprise imaging strategy

Healthcare is on a mission to improve patient outcomes and better manage costs. Enterprise imaging makes it easier for healthcare organizations to accomplish these goals by eliminating the inefficiency, complexity and roadblocks that prevent easy access to the medical image content needed to drive more informed care decisions and improve outcomes.

With no single technology to meet all of an organization's needs, many struggle to implement an effective enterprise imaging solution. Those that have been successful have taken a more holistic view and incremental approach. After all, achieving enterprise imaging is no small task. It is best taken in steps. However, these phases can be implemented in any order. Using the three-pronged strategy outlined below may 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 non-DICOM — with existing EMR, PACS and imaging archives using an image acquisition and management solution.
2. **Manage:** Eliminate departmental silos and manage imaging content from all "-ologies" in a single repository with a VNA.
3. **View:** Access, exchange and interact with medical images from anywhere with a zero-footprint enterprise viewing solution.

To implement this strategy requires a series of key technologies working in concert to centralize image management throughout the healthcare enterprise. These technologies include image capture and acquisition, VNA and an enterprise image viewer. The following pages will provide a closer look at each of these vital components.

# Unlock your imaging data

## IMAGE CAPTURE AND ACQUISITION

Medical images are typically scattered throughout healthcare facilities today, making image capture and acquisition a critical need. Radiology and cardiology images are stored in PACS, while non-DICOM specialty images such as endoscopy video and dermatology photos are stored in isolated departmental systems; CD, DVD and tape media; and even on smartphones, tablets, and other mobile devices throughout the enterprise. In fact, up to 80 percent of patient content is primarily unstructured in nature, existing as objects that include not only DICOM (CT, MRI) but also non-DICOM (JPG, MPG, PDF, etc.).

To make this more challenging, since the types of medical images that need to be centralized vary significantly in format and function, there's no single image capture solution to address all the needs. That's why a thorough audit of the entire medical image environment is needed to determine the image locations. Then, capture and acquisition technologies can be put in place to import these images from their current locations to an enterprise imaging platform. An image acquisition solution provides an end-to-end solution to automatically capture, integrate and share documents and images across departments and from any EMR and PACS.

*Up to **80 percent** of all patient content is unstructured.**

* (Source: 80 Percent of Your Data Will Be Unstructured In Five Years, Data Management Solutions Review, March 28, 2019)

When considering a solution, organizations should look for one that not only offers capture and acquisition capabilities but connectivity tools as well. The list below provides a brief overview of common image capture and connectivity needs:

- **Clinical document scanning:** Scans documents and imports PDFs as well as departmental images and DICOM CDs/DVDs into an EMR, VNA or PACS
- **Mobile capture:** Securely captures and encrypts still images and video from a mobile device and sends them to an EMR or PACS in DICOM, XDS or other popular storage formats
- **Medical video capture:** Captures high-resolution video feeds, trims, edits and sends key images to the EMR, VNA or PACS
- **Film digitizing:** Scans film and other documents, and captures images from DICOM scopes and cameras to upload into a PACS, VNA or EMR
- **Worklist solutions:** Acquires and associates patient images and video across the enterprise with patient context from the EMR
- **Content acquisition management:** Imports departmental visible light images and video, scans documents and imports PDFs into DICOM or XDS format and sends them to an EMR, VNA or PACS

## VENDOR NEUTRAL ARCHIVE

With images stored in various departments throughout an enterprise 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 eliminates data silos and provides centralized storage and standardized management of all medical content and images, regardless of their origin, native format (DICOM, XDS, TIFF, JPG, MPG, AVI, GIF, etc.) or vendor orientation, making information readily available across the healthcare delivery spectrum. The VNA provides an essential foundation for efficiently delivering a comprehensive image-enabled view of the patient that's centralized, easily accessible and can be used to better support care decisions.

A VNA can also help organizations:

- Eliminate underlying data silos and proprietary vendor formatting
- Maintain interoperability across disparate IT applications while continuing to support individual departmental workflows and preferences
- Cut 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
- Leverage built-in data migration tools for storage systems, apps and refreshing of metadata content
- Avoid costly PACS data migrations

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

**Michael Gray**
Principal of Gray Consulting

## 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 althogether. The good news is an enterprise imaging approach can actually augment your existing PACS environment.

Technologies, such as a VNA, provide an excellent bridge, offering flexibility and scalability to reap the benefits of technology advancements while protecting the investment in current systems. 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.

In most cases, this is a gradual transition where the VNA sits between the modality and the PACS to ensure image interpretation continuity. The PACS remains the front-end system for radiology departments, while the VNA allows images from the PACS and other non-DICOM repositories to be shared throughout the enterprise via core clinical systems such as an EMR.

> *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 percent of a clinician's time is wasted due to the lack of interoperable systems. That's why implementing an enterprise medical image viewer that allows viewing of any medical image, imaging report and related patient data anytime and anywhere is such a vital step in the enterprise imaging journey.

With an enterprise viewer, digital image access is no longer confined to the department that created the data. This platform empowers physicians to view 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 may be integrated with a VNA or EMR.

Finally, an enterprise 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 can perform many of their job functions without having to be physically tied to PACS workstations. With on-demand access to patient images and reports, radiologists and clinicians can realize faster diagnoses, therapy decisions and superior patient care.

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

- Image viewing across the enterprise outside of a PACS solution through a VNA or other enterprise-class archive
- Image-enabling the EMR
- 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 percent** of a clinician's time is wasted due to the lack of interoperable systems.**

* (Source: The value of medical device interoperability, Westhealth Institute, March 2013.)

# Realizing value

## BETTER PATIENT OUTCOMES

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

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 Imaging Associates, a leading imaging center in Alaska. Using a VNA and zero-footprint enterprise viewer, physicians that work with Imaging Associates are now able to view full patient imaging reports in just two hours — a task that previously took much longer with its former PACS architecture because of how slowly images downloaded and the need to search through multiple systems to track down all the images associated with each patient report.

The ability to quickly access and view full patient imaging reports anytime from anywhere enhances clinical workflow, expedites patient care and provides physicians with a more complete view of the patient, which improves all-around care and outcomes. The embedded clinical collaboration and teleradiology capabilities provided by the platform accentuate this impact.

> *"Enhanced collaboration between our radiologists and referring physicians aids in the development of cleaner, more accurate treatment plans for our patients. Additionally, once a patient imaging exam is completed, everything is in one, comprehensive, easy-to-access location."*
>
> — Jason Roach,
> Director of IT, Imaging Associates

## 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, standards-based and adheres to DICOM and HL7 as well as IHE and XDS framework:

- 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 IT to universally apply security protocols (e.g. disaster recovery plans, encryption, etc.) to all images
- Protects PHI from unwanted exposure

### Case in point

At University Hospital Health System (UH) in Cleveland there were 3.8 million studies performed between 2004 and 2011 under its original, PACS-based environment. With the use of a VNA, their disaster recovery system has expanded to encompass 4.8 million studies. Because of this, UH is better protected from disastrous and costly data breaches.*

* (Source: Three Ways a Vendor Neutral Archive Helps Providers Reduce Costs, Medical Imaging Talk Blog, 2015.)

## LOWER COSTS

Like other businesses, hospitals must enhance the customer experience, improve quality and reduce costs to remain profitable 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 for patient-centered care
- Lowering hospital readmissions
- Increasing workflow efficiency and clinical productivity
- Eliminating costly PACS data migrations and departmental system maintenance
- Addressing reductions in radiology reimbursements by offering operational and capital alternatives to traditional PACS
- Facilitating an integrated central point for all images, providing savings over departmentally siloed imaging solutions

### 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 they move additional PACS over 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
- Lifecycle management
- M&A transactions
- Workflows/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 CHRISTUS Health. Prior to implementing a VNA as part of an enterprise imaging strategy, CHRISTUS clinicians had to manually search through multiple systems at multiple facilities to access all the images associated with a patient record. This task was time-consuming and tedious. With the VNA, those images are centralized and accessible from a single repository, streamlining clinical workflows and maximizing productivity.

> *"A patient may have ten different medical images at three different CHRISTUS facilities. Using our VNA, we're able to pull up all of a patient's clinical content without having to go to each separate location. The VNA provides standardization, intelligence and workflow to make all of this possible."*
>
> — Lynn Gibson,
> Vice President and Chief Technology Officer,
> CHRISTUS Health

# Conclusion

## SEE WHAT YOU CAN DO NEXT

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. But achieving order among the chaos is possible. Enterprise imaging can provide a solution to inform clinical decisions at the point of care with standard capture and archiving management and viewing capabilities. However, evaluating the best enterprise imaging solutions and course of action for your organization can be a daunting task.

The strategy presented in this ebook is designed to help. It provides a three-pronged approach to help organizations think through how to connect, manage and view medical images. The ebook also outlines the combination of technologies needed to implement an enterprise imaging strategy including capture and acquisition, a VNA and enterprise viewing. As organizations walk through this process they should think of it as a journey. Each technology can serve as a giant step forward, but no single technology can meet all of an organization's medical image needs. By taking these steps and implementing these technologies, your organization can be well on its way 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. By securely connecting critical medical imaging silos to an EMR, VNA or PACS we can provide clinicians and specialists with 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.

UNC Health Care case study

CHRISTUS Health case study

Vanderbilt Medical Center case study

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