



SHEDDING LIGHT

ON ENTERPRISE IMAGING



INFINITT
North America



One Platform, INFINITT Possibilities

TABLE OF CONTENTS

1. Enterprise Imaging Still an Elusive Concept
The EI Imperative
2. Current Situation – A Pivot Point
Enterprise Imaging Drivers
3. Challenges on the Road to Effective EI
Clear Benefits in Pursuing Enterprise Imaging
4. Gaps in Current Solutions
5. Essential Requirements for Successful EI
6. Road to Success
7. Conclusion



ENTERPRISE IMAGING STILL AN ELUSIVE CONCEPT

Enterprise Imaging (EI), much discussed in the healthcare industry and a major area of interest for both image-generating departments and IT, remains an important but elusive concept for many. Explanations of EI abound, creating uncertainty. A HIMSS-SIIM workgroup has developed a core definition to help: *“Enterprise Imaging refers to 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.”*¹

It’s a comprehensive vision with many considerations and decision points. Moreover, many of the solutions offered under the banner of EI are emerging at best. There is some inevitable technological hype in the mix as well. Navigating this landscape can be confusing, potentially slowing progress toward your goals. According to one research firm, the unclear definition of products such as Vendor Neutral Archive is a restraint on growth of the category.²

This white paper explores enterprise imaging in detail and aims to

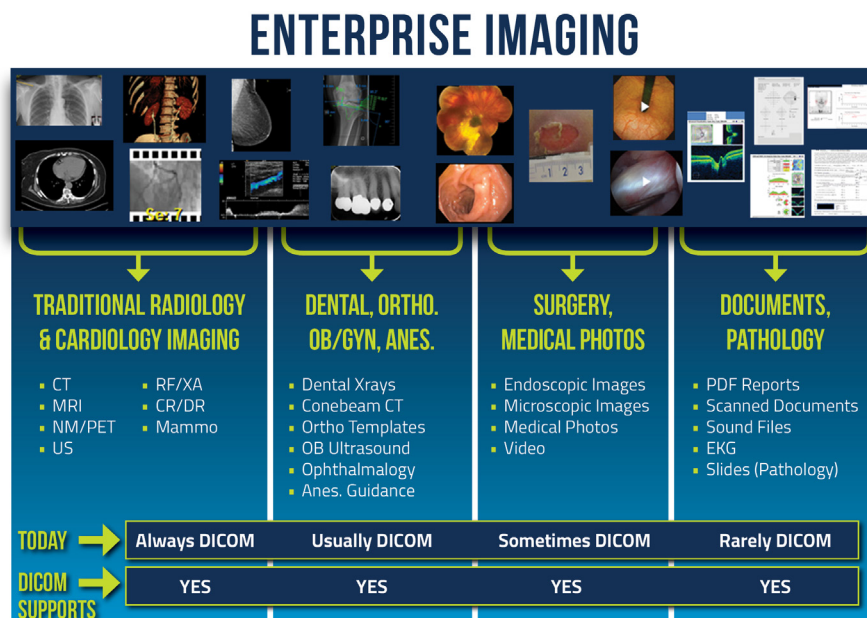
illuminate the subject for IT leaders seeking a path to success.

THE EI IMPERATIVE

As the HIMSS-SIIM definition implies, enterprise imaging is motivated by a desire to bring together images generated in diverse locations and in multiple formats. EI represents a key part of the overarching drive in healthcare to centralize and manage all information at hospital, system, and community network levels. EHRs have in many ways become the “central nervous system” of this effort. With images proliferating - the average patient record contains 25 scans - the need has grown substantially to address their archiving, availability, and use within the EHR environment.³ EI has consequently become a significant IT imperative.

A core component of this expansive view is the ability to integrate non-DICOM images into a complete image management strategy. Figure 1

shows examples of the HIMSS formulation of the four major types of imaging content that require consolidation: diagnostic, procedural, evidence, and clinical reports.



Source: K. Persons, Mayo Clinic

(figure 1)

1. C. Roth, L. Lannum, K. Persons, “A Foundation for Enterprise Imaging: HIMSS-SIIM Collaborative White Paper,” *Journal of Digital Imaging* online, May 31, 2016.
 2. Markets and Markets, VNA & PACS Market – Global Forecast to 2018, 2013.
 3. Galen Healthcare, “Healthcare Data Archival Infographic,” July 2016.

CURRENT SITUATION – A PIVOT POINT

Most hospitals are on a steady journey toward enterprise-level data integration. Having been immersed for several years in EHR implementation and data repository construction, hospitals are now placing high strategic value on including imaging and perceive EI as a priority over the next 12-18 months. Vendor Neutral Archive is a typical initial consideration, but is only a beginning.



Each organization brings to enterprise imaging different requirements and states of readiness. Hence you need a partner who can demonstrate real flexibility to engage with you beyond simply presenting a laundry list of software modules and features.

ENTERPRISE IMAGING DRIVERS

What is creating the momentum for EI in healthcare organizations? Several important drivers are forming the strategic and economic rationale for enterprise imaging:

- Healthcare’s fundamental business model transformation from volume-based to value-

based reimbursement. This migration places a major premium on information that helps drive actions to achieve the twin objectives of better care and financial health. Advanced analytics leveraging machine learning and other technologies are being looked to for answers, and these systems are by nature data-intensive. As IDC notes, *“Since artificial intelligence depends heavily on high quality data inputs, IT will need to invest in technologies to ingest, profile, validate, and cleanse multiple streams of high volume data.”*⁴

- Industry consolidation ups the ante by challenging organizations to manage images from diverse locations such as merged hospitals, acquired groups, and the like.
- Patient satisfaction/consumerism demands are fueling the need to provide greater access to images as well as more patient-radiologist interaction. Some have dubbed this movement “patient-centered radiology.”

WHAT TO LOOK FOR IN AN ENTERPRISE IMAGING PARTNER

- Proven Integrator
- Agile Development
- Deep Imaging Expertise
- Long-Term Data Vision

4. IDC, IDC FutureScape: Worldwide IT Industry 2018 Predictions, October 2017.

CHALLENGES ON THE ROAD TO EFFECTIVE EI

Despite the growing attention to enterprise imaging, adoption and progress remain in nascent stages. Several barriers exist:

- **IT knowledge gaps.** As IT increasingly leads the way toward EI, it faces a steep learning curve about the unique requirements of imaging, which has long been a separate province of the radiology department.

- **Incorporating “encounter-based imaging.”** Once again, a HIMSS-SIIM group defines the term and scopes the issue:

“Images are being captured with increased frequency across specialties outside of radiology and cardiology throughout medical enterprises, including dermatology, ophthalmology, wound care, otolaryngology, and emergency departments. Secure, centralized, and efficient image storage and management is challenging ... We define encounters-based imaging as being performed during a clinic visit or procedure when image content acquisition is not considered the purpose of the visit.”⁵

- **Lack of system integration.** Information silos are a well-documented problem in healthcare. Many systems that deal with images are not integrated with the EHR or other central repositories. For example, a recent survey showed that 53% of radiology departments do not have a PACS-EMR integration – and that is in academic centers which typically are more technologically advanced than community hospitals!⁶

CLEAR BENEFITS IN PURSUING ENTERPRISE IMAGING

Enterprise imaging contributes heavily to the development of a comprehensive single patient record resulting from merging all key patient data. The benefits of this consolidation are far-reaching and include:

- Improved patient care as caregivers have ready access to the information – and patient context – that they need.
- Ability to perform advanced analytics. This technology will be ubiquitous in a few years, with forecasted annual growth rates of nearly 16% to create a \$15 billion global market by 2022.⁷ Meaningful insights will be generated with positive impact on cost savings, clinical outcomes, population health management, and more.
- IT cost savings and risk reduction. Whether implemented behind the firewall or in the cloud, the EI integrated platform concept offers reduced support requirements, less need for failover investment, and other cost/time benefits compared to today’s disparate systems. In the current world of overstretched IT departments and constrained budgets, those present substantial ROI.



5. D. Cram, C. Roth, A. Towbin, “Orders- Versus Encounters-Based Image Capture,” *Journal of Digital Imaging* online, July 14, 2016.

6. D. Forsberg, B. Rosipko, J. Sunshine, and P. Ros, “State of Integration Between PACS and Other IT Systems: A National Survey of Academic Radiology Departments,” *Journal of the American College of Radiology*, July 2016.

7. BCC Research, *Healthcare Analytics: Technologies and Global Markets*, 2017

GAPS IN CURRENT SOLUTIONS

It is reasonable at this point to wonder whether current systems that may be regarded as capable of enterprise imaging are sufficient. A brief review of the shortcomings of the leading candidates is in order.

EHR

Electronic health record systems are clearly the backbone for enterprise-wide information management. They are now nearly universal and will be the repository for patient data. But despite sometimes offering radiology or related modules, EHRs typically exhibit *“limited capability to index and tie metadata to medical images, perform image lifecycle functions, or share images outside of the EHR system.”*⁸ A leading academic radiologist at Johns Hopkins Medicine concurs: *“The EMR handles text data really well, but it does not know how to handle diagnostic images very well. It’s not a medical image management system.”*⁹

PACS

PACS remains a powerful tool for radiology departments, imaging centers and other DICOM-centric operations. However, Markets & Markets summarizes concisely: *“PACS was not designed with the need to consolidate data across an entire enterprise.”*¹⁰ Over the past several years, “Enterprise PACS”



solutions have emerged in an effort to expand the data range by accommodating cardiology and other imaging-heavy departments, but these systems are still largely optimal for DICOM-based imaging only.

VNA

The opposite trend has been more actively pursued of late: “deconstructing PACS” to solve some of the gaps. The idea is to open the core functionality and modularize it. Vendor Neutral Archive is a centerpiece of this strategy. Its primary features are Cross Data Exchange (XDS) workflow support, vendor independence, and ability to use a universal viewer.

Some have equated VNA plus a viewer to enterprise imaging. But there is far more to the EI concept than that. VNAs have limitations, *“lacking in image workflow management tools like exceptions handling and content validation, serving solely as storage repositories for XDS content and images.”*¹¹

Legacy and non-traditional departmental imaging systems

Most standalone systems supporting some type of imaging are limited to creating picture files to be used for fairly narrow interpretation and reporting. Little to no metadata is generated or accommodated. Many of these systems also are difficult to integrate to one central system.

8. See Cram, Roth, and Towbin, previously cited.

9. E. Godt, “Growing Together: Demonstrating Value for Enterprise Imaging with Six Use Cases You Can Implement Today,” *Clinical Innovation + Technology*, April 25, 2017.

10. See Markets and Markets, previously cited.

11. Cram, Roth, and Towbin.

ESSENTIAL REQUIREMENTS FOR SUCCESSFUL EI

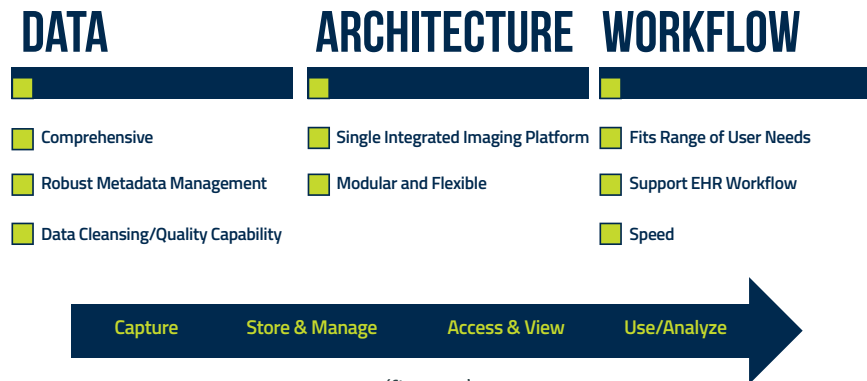
Enterprise Imaging encompasses every critical stage of the imaging cycle: Capture – Store & Manage – Access & View – Analyze. We contend that there are fundamental requirements for true, lasting EI that IT leaders must take into account as they develop strategies. These prerequisites must be met or EI will underperform and vendor assessment will be problematic. The crucial requirements fall into three areas as shown graphically in Figure 2: Data, Architecture, and Workflow.

Data Requirements

- **Comprehensive.** It is imperative to aggregate all image types.

Key to this effort is ability to manage effectively and optimally both orders-based (DICOM) and encounters-based (JPG, MP4, ECG and many others) formats as well as the range of required data standards (MPI, PIX, XDS).

- **Detailed metadata.** Storing data without associated metadata is like a library of books without titles or indexing system. The ability of EI to generate and take advantage of rich metadata is crucial. This fact is particularly true for encounters-based imaging where information needed can include body part, location of procedure (e.g, "bedside ultrasound"), acquiring specialty, admitting diagnosis, and many other markers.



(figure 2)

- **Data cleansing.** As information is consolidated from diverse and legacy systems, strong data cleansing is absolutely critical to maintaining the level of accuracy and consistency needed for effective care and downstream analytics. This effort can be considerable and issues such as HIPAA can come into play. Moreover, cleansing requires vigilance and should be an ongoing process rather than a one-time project.

System Architecture Requirements

- **Single integrated imaging platform.** EI requires a robust platform, not just a collection of software components. It should integrate easily with a variety of current and future systems to provide complete data and foster interoperability. The right platform is also vendor-neutral, mobility-enabled, scalable to handle the growing mountain of data, and fully standards-based.

- **Modular and flexible.** Because enterprise imaging is an emerging strategy, determining your organization’s optimal rate of adoption is key. That means you want a platform that is flexible to adapt to your pace and needs while offering sufficient modularity to give you options. A point to consider: many vendors build a large module set through acquisition rather than internal development. That can lead to an under performing EI platform if the outside software is not integrated well – a common challenge.

ESSENTIAL REQUIREMENTS FOR SUCCESSFUL EI (CONTINUED)

Workflow Requirements

- **Accommodate dual imaging workflows.** EI must map preferred processes of users and consumers of both orders- and encounters-based imaging. Impeding these workflows risks care delivery impact and productivity loss. The ability to cross workflows is equally important. For example, original DICOM data should be able to be delivered in non-DICOM format.
- **Support EHR workflow.** Complete, multi-level integration is needed. EI is more than just being able to use an image viewer within EHR software.
- **Speed of access/delivery.** A hallmark of PACS has been speed. A shortcoming of the move to VNA is that DICOM image retrieval is slower in many cases. The diverse array of enterprise users, no longer limited to radiologists, will not tolerate time penalties resulting from EI. Any solution needs to offer streamlined access and delivery.

THE ROAD TO SUCCESS: RECOMMENDATIONS

This paper has asserted that there is no one right way to pursue EI despite what some industry advertising and pundits may be stating. So, what is the best path to success? Our experience suggests a five step approach.

FIVE STEPS TO SUCCESSFUL ENTERPRISE IMAGING



Take the long view

EI is evolving toward a larger outcome than just “image enabling the EMR.” Don’t jump at what seems to be the latest technology trend. Migrating to VNA or adding it to an existing PACS environment may be a good next step for some. Recognize, though, it is, as one analyst noted, “a short to midterm fix.”¹² Keep your focus on the essential requirements we detailed earlier. Decide where you are on the EI maturity curve and plot a comfortable roadmap.

Select technology/services partners who share the long perspective

Implementing that roadmap requires a vendor with strong technology development skills and willingness to adapt its EI solutions to your needs. Such capabilities also de-risk the future, since innovation will be necessary to meet shifting requirements over the long-term. Closely examine a system supplier’s development commitment and record of success.

Invest in a strong platform

While having a portfolio of software modules is important, avoid vendors with the “laundry list” syndrome in which the components do not appear to be unified into a robust, flexible, and natively developed platform. Complete integration capabilities and ability to overcome the access speed issues that have plagued traditional VNAs are other essentials of the ideal platform.

12. S. Holloway, “Is Enterprise Imaging on a Slow Road to Mediocrity?” AuntMinnie.com, August 16, 2017.

THE ROAD TO SUCCESS: RECOMMENDATIONS (CONTINUED)

Focus on metadata capabilities

Solid metadata tagging - especially for encounters-based imaging – is a must. Look for an EI system possessing software with user-definable fields to enable easy, on-the-fly entry of appropriate tags, attributes, and other contextual identifiers (see Figure 3 as an example). Such fields and templates should be “smart” in that if the user is employing wound care software, for instance, the metadata entry fields germane to that specialty are automatically presented to save time and reduce errors.

Migrate clean data

Scrubbing data brought in from many sources can be problematic and time-consuming. Yet it is a critical task for data comprehensiveness on the one hand and data quality on the other. The need to support sophisticated analytics and a diverse enterprise-wide user base makes it unwise to settle for limited, “just good enough” data. Seek a technology partner who can provide such cleansing services successfully. We find that many hospitals turn to the outside to perform the migration function.



(figure 3)

CONCLUSION

Enterprise Imaging is a major long-term trend with significant ramifications. It is still an emerging concept with opportunities and pitfalls. The ideas and models offered here should help all navigate the issue successfully and take another giant stride toward value-based care.

ABOUT INFINITT NORTH AMERICA

INFINITT North America is a wholly-owned subsidiary of INFINITT Healthcare, with a market presence in 51 countries. INFINITT’s web-based enterprise imaging solutions include RIS, PACS, Cardiology Suite, Mammo PACS, Dental PACS and 3D/Advanced Visualization software, all running on a single database platform. INFINITT PACS ranked #1 Category Leader in 2017 Best in KLAS Awards: Software and Services for the Community Hospital market.* Learn more at: www.infinitna.com

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