



# Development & Implementation of Enterprise Imaging

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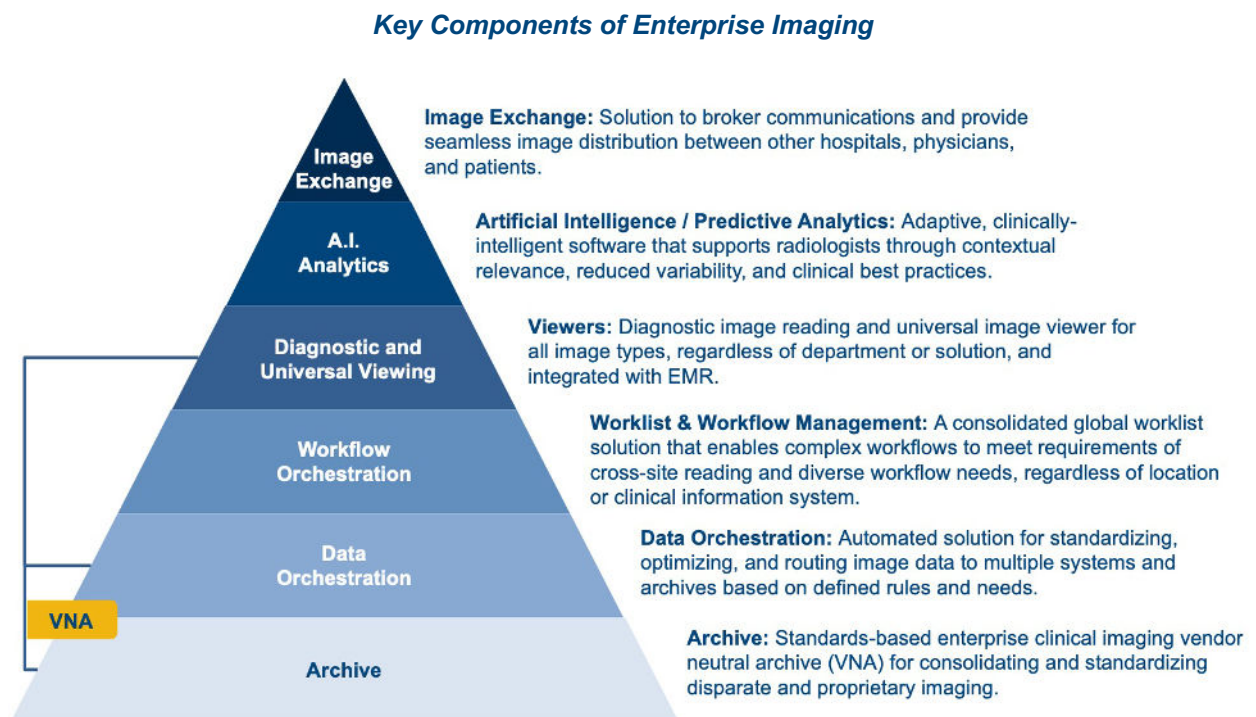
Report

## The Shift to Digital Enterprise Imaging

Hospitals are moving increasingly into the digital space. As many health systems have implemented electronic medical record and enterprise resource planning systems, the next big priority for many is enterprise imaging (EI). Radiology was essentially the early adopter with the development of the [NEMA DICOM](https://en.wikipedia.org/wiki/DICOM)<sup>1</sup> standards for radiology in the 1980s, which set the foundation for digital imaging across organizations and computer platforms. Now, several other areas within healthcare have joined the digital environment including many new methods for acquiring digital images at the point of care. This has led to the concept of EI, which extends well beyond diagnostic imaging (radiology, cardiology, ophthalmology) into areas like wound care, digital pathology, dentistry, surgery, efaxing, and legacy data management, just to name a few.

EI is "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."<sup>2</sup> It provides a central point of control and access, redundancy, disaster preparedness, and ease of access at anytime from anywhere. Ideally, EI is set up to give users secure, non-complex access to all images involved in patient care through a limited number of applications.

The following diagram illustrates the key components of enterprise imaging.



<sup>1</sup> <https://en.wikipedia.org/wiki/DICOM>

<sup>2</sup> Roth, CJ; Lannum, LM; Persons, KR (2016-10-01). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5023525>. *Journal of Digital Imaging*.

## Capturing Images

EI now has the capability to handle most electronic data acquisition devices, including point of care (POC) devices such as portable ultrasounds and digital cameras. POC devices usually require automated meta data (data about the data, e.g., patient name, date of birth, date, time, procedure, body part, etc.) for gathering information needed to integrate with the imaging archive databases. Having such tools allows for near real-time data availability, which is crucial in emergency care or aiding in the treatment planning of trauma cases while a patient is still in transit. Furthermore, EI helps with data standardization, allowing for better analysis, collaboration, and engagement by all parties. This also sets the groundwork for introducing targeted artificial intelligence (AI) applications, as business/research cases are identified in the organization.

## Viewing Images

Enterprise image viewers have evolved from specialty viewers that could only handle specific types of images to highly versatile systems that can simultaneously display many image types at high resolutions from various sources. This can allow clinicians to view radiology, cardiology, photos, reports, etc. on a single screen or launch the viewer from inside the EHR (Electronic Health Record). Recent Federal<sup>3</sup> regulation went into effect October 6, 2022, which requires EHRs to give patients access to their records. At this point, the regulation only requires reports, not images; however, the government roadmap indicates images will be a requirement in the future. Regardless of regulatory compliance, accessing digital data is far easier than physical data with the caveat that maintaining data security becomes paramount.

Images can also be accessible on private devices (cell phones) that have the proper authentication. These “zero-footprint viewers” rely on server-side rendering to ensure that no image data is ever stored on the private device. Once a viewing session ends, all data associated with the image is gone. Note, any software that requires user installation is not a zero-footprint viewer. Organizations should be positioning themselves to provide secure electronic access to images in conjunction with the implementation of enterprise imaging.

## Storing Images

In the development of an EI framework, decisions on how the data will be stored and accessed should be a priority. This could include the presence of a vendor neutral archive (VNA), which can store data from any (vendor) device. VNAs have the benefit of storing any type of image (movie, still, volumetric, etc.) in one database. Physically the VNA may be on-premises, in the cloud, or a hybrid of the two, a decision driven by user needs (i.e., how quickly or how often the images need to be accessed). The VNA can also be the primary means of sharing images with other healthcare facilities, providers, or the patient. The advantage of VNA systems is they no longer require facilities to generate physical media (e.g., films, CDs/DVDs, memory sticks, etc.) and instead allow an authorized party to download from anywhere at any time.

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<sup>3</sup> 21st Century Cures Act – Information Blocking. [https://www.healthit.gov/sites/default/files/cures/2020-03/ONC\\_Cures\\_Act\\_Final\\_Rule\\_03092020.pdf](https://www.healthit.gov/sites/default/files/cures/2020-03/ONC_Cures_Act_Final_Rule_03092020.pdf)

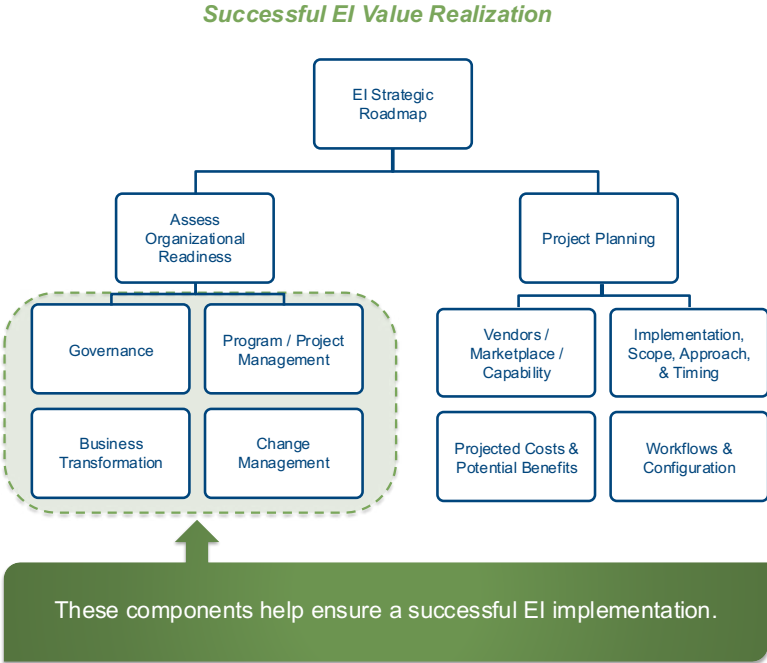
Data migration of existing images may be needed to populate a new VNA. This can take a substantial amount of time and expertise to not only ensure clean (accurate) data but also ensure the data conforms to the retention and risk minimization policies for data storage. Organizations will often enlist a third-party to ensure a quality data migration, but someone within the organization will need to be involved to address questions.

Digital images are just another form for data. Properly managed and indexed this data stream can contribute to improving data acquisition workflows, research using anonymization tools, enhanced image sharing, as well as testing artificial intelligence (AI) algorithms to ensure they correctly evaluate your data when a new tool is deployed.

### Planning & Implementing Enterprise Imaging

Getting ready for an EI program requires the definition and coordination of multiple components, including a defined strategic roadmap, governance, project teams, communications, and planning. The broad organizational reach of EI requires long-term engagement and participation from many business and clinical stakeholders. Ensuring their involvement in planning and readiness for the coming changes will be key to success. The graphic that follows outlines the elements involved in an EI program.

*Elements of a Successful Enterprise Imaging Program*



**Defining an EI strategy and roadmap.** Developing an EI capability requires a defined strategy and roadmap, and these must be integrated with the overall digital delivery strategy and IT architecture of the organization over the mid- and long-term. Digital imaging spans a large diversity of image acquisition devices and requires integration with EHR, the ability to view images on many types of devices, adherence to security standards, integration with thin-client

environments, leveraging existing storage, adhering to image retention policies, and enabling streamlined image sharing capabilities.

**Establishing governance.** The involvement and coordination of such a large, diverse group requires the presence of appropriate governance for decision-making and development of policies for data, security, and compliance within the organization and the federal government. Governance also requires methods for ensuring adherence to policies and procedures, including remediate actions if individuals or departments are out of compliance.

**Assessing the current state.** To get started, you will need a clear understanding of what applications and imaging modalities are in use, how these images are being stored, and how the images are currently being used and accessed within your organization. Additionally, you'll need to ascertain the existing image volume (number of images and storage space consumed), the known growth rate of these image archives, and how much of the data may already be exceeding the required retention period. You should engage the IT/IS team to discuss the strategy for storing data and the applications in the short, medium, and long term.

The discovery assessment should be extended to imaging vendors to ensure they have the capability to deliver their images in accepted open-source formats without special data fields that could hinder the storage, processing, and dissemination of images on the organization's preferred image display application.

**Demonstrating EI capabilities.** Next, you will need to plan which specialties to include in your initial implementation. Radiology and cardiology are frequently elected to be the first departments to demonstrate the capabilities of a new system, but there are advantages to starting with a smaller specialty. Ophthalmology or dentistry provide a well-defined environment for testing technologies and how they affect workflows. For example, capturing standalone modalities like POC ultrasound typically requires changes in how these studies can be requested/ordered and potentially billed. This will have impacts on workflows, the EHR, or existing PACS (Picture Archiving and Communication System) that traditionally may have ordered/scheduled studies.

**Developing a budget and resource plan.** Any EI project should have a long-term fiscal budget that includes a resource plan to ensure that funding and staffing will be available as the program unfolds and scales. Monetary return on an EI investment will usually not be immediate but will continue to increase as the centralized digital management of data expands and older inefficient applications and archives are retired. Given the considerable resource requirements, embarking on EI should not be rushed and should not be tied to other large projects such as changing an EHR or attempted in the midst of an organizational merger.

## Conclusion

In summary, EI encompasses much more than storing and viewing images. Digital images are data that are subject to all the compliance requirements that other health information is subject to with security and data governance addressed at inception stage. Inclusion of all health delivery areas generating images should be performed when the requirements for EI are being gathered. Having Health Information Management (HIM), Compliance, and Information Technology groups

at the table ensures that all stakeholders have a voice. All the processes for acquiring, reviewing, indexing, storing, retrieving, sharing and deleting should be documented to compile all requirements prior developing the EI architecture and selecting vendors to implement.

Impact Advisors has a team of experienced individuals who can advise and assist in the development and implementation of an EI strategy including the selection of EI vendors that match organizational needs.



### About the Author: Martin Kappeyne, PMP, CPHIMS

Mr. Kappeyne has over 20 years of healthcare experience including strategic planning, vendor evaluation and selection, workflow improvement / redesign, implementation project management, operations management, and staff development. Martin’s broad command of healthcare imaging, interfaces, data migration and clinical systems integration enables him to work effectively with clinicians, operations, and IT.

### About Impact Advisors

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