Merge

IMAGING STRATEGY PAPER

How Carle Health deployed an enterprise imaging strategy to integrate 8 hospitals' imaging data

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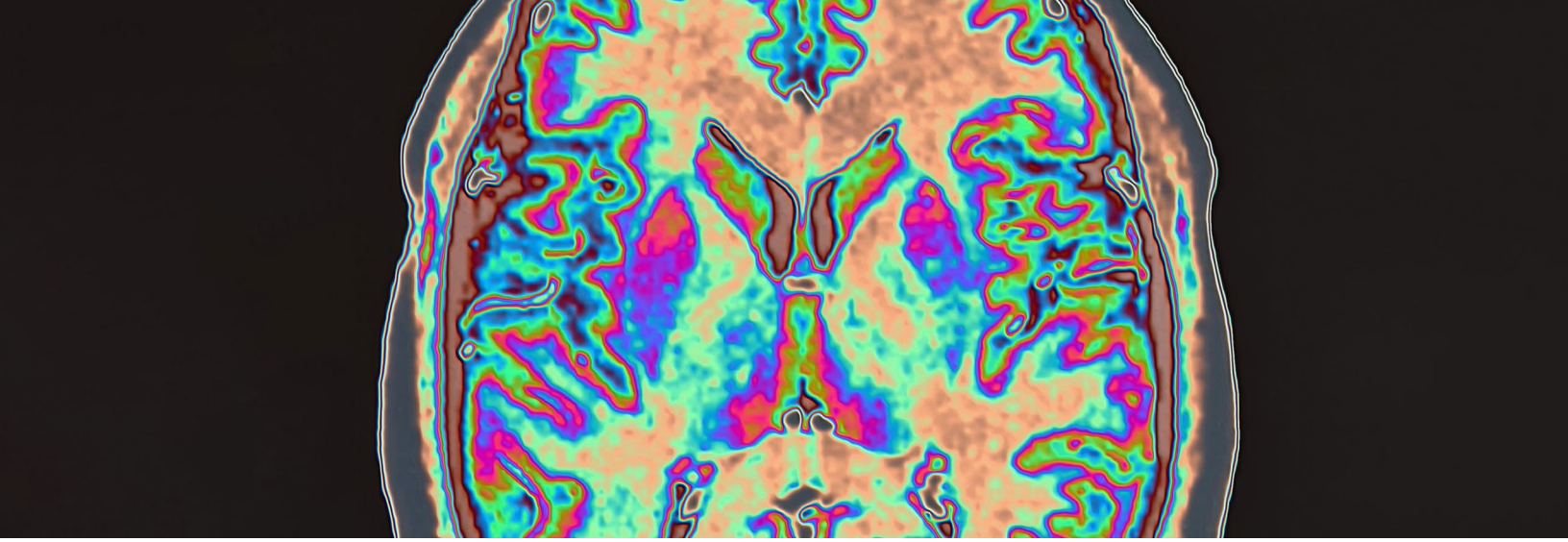

Introduction

In the evolving landscape of imaging technology, Enterprise Imaging (EI) has emerged as a pivotal innovation, helping to transform the way healthcare organizations manage and utilize imaging data.

"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 (EHR)."

- The Society for Imaging Informatics in Medicine's definition of Enterprise Imaging

This whitepaper addresses lessons learned on developing and deploying an enterprise imaging strategy from Carle Health. Dr. Doug Morton, a practicing neuroradiologist at Carle Health, and Kelly Oppe, the organization's Clinical Imaging Director, led a multi-functional team through a transformative EI initiative to unify imaging data across multiple hospital sites, enable cross-enterprise care collaboration, and image-enable patient portals. In partnership with Merge by Merative, which supplied the technology components and deployment expertise, the team at Carle Health continues to rack up many EI successes as they expand operations and evolve their infrastructure to be usable by smaller private practices that operate in their regional health ecosystem.

The need for EI is driving healthcare organizations to enhance clinical workflows, improve patient outcomes, and streamline operational efficiencies across their enterprises. Rooted in the traditional siloed approaches to medical imaging technology, these providers often have different departments and specialties operating on disparate imaging systems. This siloed model fragments patient data, leading to inefficiencies and potential diagnostic delays.

Enterprise imaging can address these challenges in three main ways.

The first is by creating a centralized repository that supports a comprehensive view of a patient's imaging history, regardless of the source or format of the data – e.g., a "vendor-neutral archive." A holistic integration of images facilitates better clinical decision-making and ensures that imaging data is readily available to all relevant stakeholders and specialists across the care continuum – including radiologists and cardiologists.

The second critical capability is to enable image sharing and viewing between stakeholders, specialists, and the patients themselves. Not having to search patient imaging data reaps time savings that can instead be applied to patient care. Additionally, the ease of image-enabling the patient portal affords a cost-effective way to comply with Cures Act regulations, which mandate accessibility and sharing of health information.

A third critical advantage of EI is to enhance interoperability within and across healthcare institutions. By adhering to standard protocols such as DICOM (Digital Imaging and Communications in Medicine) and HL7 (Health Level Seven), EI systems enable seamless data exchange and integration and overcome the barriers that previously hindered effective communication and collaboration. Interoperability is crucial for supporting telemedicine, multidisciplinary team meetings, and integrated care pathways.[1]

The strategic deployment of EI also aligns with broader healthcare objectives, such as improving patient engagement and satisfaction, and enabling portals with access to imaging records to comply with regulatory requirements like the Cures Act. But like any other technology transformation, implementing EI can be quite complex and has its challenges. Between technical considerations, workflow modifications, organizational change management, and general user adoption, EI projects take time and sometimes take unexpected turns before the best path forward is clear.

How an enterprise imaging journey started by accident

For Carle Health, the journey to an enterprise imaging architecture across their hospitals started completely by accident.

Up until 2018, Carle Health was comprised of just two hospitals in Illinois, which took a "best of breed" approach to their imaging solutions portfolio: different systems provided by different vendors, based on the use case. In other words, a radiology PACS from one vendor, a transcription system from another supplier, a vendor neutral archive from a third partner, and so on.

As their PACS system became outdated, neuroradiologist Doug Morton, MD, and his team were tasked with not just finding a replacement solution, but one capable of expanding with and supporting Carle Health's plans for rapid growth. That meant a system capable of consolidation, eliminating the data silos that had grown out of using five PACS systems from different vendors; it meant concentrating all of the hospital group's imaging into a single, central repository.

Under the old model, radiologists like Dr. Morton could not see a patient's cardiology or ophthalmology images. But the leadership made the decision that it would be better for patient care if doctors could see the entirety of a patient's imaging record, not just whatever was siloed off in their practice area. Clinical photography, point-of-care ultrasound, scope images, digital pathology – all these images would need to go into the repository. That project got underway with the selected solution, Merge VNA, and gave birth to Carle Health's enterprise imaging journey.

Just a few years later, Carle Health has now expanded to include eight hospitals, with a centralized, vendor-neutral imaging repository that has grown, thanks to combined Merge VNA and Merge Universal Viewer support, to absorb and integrate the data migrations of nearly 900 terabytes of patient data.

> "I asked our leadership team; how big should we go with the PACS and VNA implementation? I was told, 'Solve the problem with something that can grow with us.' That's why we chose Merge."

- Dr. Doug Morton
  Neuroradiologist, Carle Health

Optimizing workflows: keep what works, enhance the rest

A major reason why this new enterprise imaging strategy has been a success is owed to the fact it optimized clinical workflows – and, just as crucially, did not disrupt these workflows or give clinicians a reason to become frustrated in the process.

For example, by integrating the data from their cardiology PACS into Merge VNA, Carle Health was able to deploy a pre-fetch algorithm that pushes cardiology images from the VNA into the cardiology PACS, to be ready when a patient shows up for their cardiology appointment. This provides everyone across the enterprise with full visibility into that patient's history – something that was not possible before.

If a patient had an appointment for a carotid ultrasound or cardiac echo, these images could only be seen by clinicians on the cardiology team. And if that patient's cardiac history was of relevance to appointments with other clinicians in other departments, the only data available to the doctors was the written medical history taken by the cardiologist. Now, because these images are stored in the VNA's common archive, any doctor across the enterprise who is involved with that patient's case can look at the images to make better informed recommendations for patient care.

Clinicians in the Carle Health system now only need a single viewer to access a patient's entire imaging history. Prior to the enterprise imaging implementations, a cardiology viewer would be needed to view cardiology images, a radiology viewer for radiology images, and so on. Now it has been consolidated in one place, with a single universal viewer needed to view the images by anyone, anywhere across the health system.

This centralization of imaging data marked a significant transformation for clinical workflows at Carle Health, increasing data access and visibility – all without disrupting and negatively affecting existing workflows in the process.

"The IT teams got together and figured it out. The cardiologists were not bothered by it because they got to keep their cardiology PACS; their workflows were unchanged. The change just meant storing images long term for them. We weren't changing what they did or disrupting their day to day at all."

- Dr. Doug Morton
Neuroradiologist, Carle Health

In fact, this strategy was successful not because of any elaborate grand governance scheme, but simply by talking to the physicians in each department – radiology, cardiology, dermatology, etc. – to solicit feedback on how workflows could be better optimized to meet clinical needs.

As it evolved, Carle Health's enterprise imaging strategy expanded beyond clinicians to address ways to improve the patient experience. In response to regulatory mandates in the Cures Act, Carle Health integrated the universal viewer's capabilities into the patient portal. With minimal effort, patients began using the portal's new capabilities to see their medical images alongside their doctors' reports. Carle Health incorporated an additional capability from another vendor that provides explanations of medical terminology in everyday language to help make the information understandable for patients. Usage has grown to upwards of 10,000 patients a month who can easily view their own images whenever they need.

"At first, we wondered if that access would lead to questions or anxiety about what certain images or reports meant out of context. But it hasn't. Patients just want to know their results. And now they have everything they need to have more meaningful conversations with their doctors."

- Dr. Doug Morton
Neuroradiologist, Carle Health

"The portal really has garnered a lot of feedback. The patients have everything they need to understand their reports and they can go to their doctor and actually have a meaningful conversation with them... which was the whole point of the Cures Act."

- Kelly Oppe
Imaging Director, Carle Health

Making interoperability and integration work: Enter the 'Holding Pen'

Building an enterprise imaging strategy that could scale with Carle Health's growth wasn't just about optimizing workflows. After the initial Merge VNA and Merge Universal Viewer implementation was complete, and Carle Health began expanding rapidly, it became clear that there would be a lot of new data migrations on the way. The imaging solutions deployed had to be capable of integrating data from up to eight hospitals, each of which brought a host of their own imaging solutions and siloed patient data, with no guarantee of data cleanliness.

In fact, in many cases, the data was simply not clean at all. Data fields were filled with wrong or bizarre tags. Each hospital had different medical record numbers. Data that was supposed to be DICOM was not actually DICOM at all – or least, stretching the definition of the standard – which added new complications to pooling data together and getting disparate systems from equally disparate environments to talk to each other.

Additionally, imaging data from outside sources such as a referring hospital or an emergency clinic used to be problematic, when it was unclear whether the data should be admitted into the Carle Health systems at all. For example, not knowing exactly which images to send for a referred patient, a batch of both relevant and irrelevant images would be forwarded. With the transient cache feature of their enterprise imaging foundation, Carle Health was able to develop a new approach to this problem: the "Holding Pen."

The Holding Pen provides a temporary environment for receiving images from outside Carle's system – regional referrals, regional consults, trauma transfers, etc. – to be reviewed and properly tagged prior to patient admission. This has proven to be a valuable advantage in integrating and cleaning outside imaging studies.

"Patients can go to any of our local hospitals for appointments, and if they come to Carle Health for an emergency, we will have access to their entire record. Wherever they choose to go in our system, they will be fully known by the clinician that sees them."

- Dr. Doug Morton
Neuroradiologist, Carle Health

Charting an enterprise imaging future

When Carle Health began its enterprise imaging journey, it started with big goals: integrating and consolidating their radiology and cardiology PACS and cleaning up the DICOM data labels among them. Now that that project has been a success across their system of hospitals, Carle Health is looking ahead to the next major milestones in their enterprise imaging expansion, including:

- Consolidating ophthalmology data.
- Standardizing non-DICOM data across its hospitals' proprietary databases.
- Consolidating clinical photography images and videos.
- Developing a strategy for point of care ultrasound workflows.
- Pushing digital pathology into a hybrid-cloud environment.

Carle Health's enterprise imaging journey underscores the transformative potential of integrated medical imaging systems in modern healthcare. By consolidating disparate imaging data into a centralized, vendor-neutral archive, Carle Health has not only enhanced clinical workflows but also significantly improved data accessibility and patient care. This case study highlights the critical role of interoperability, workflow optimization, and clinician engagement in the successful deployment of enterprise imaging solutions.

As healthcare organizations continue to navigate the complexities of data integration and management, the lessons learned from Carle Health's experience offer valuable insights. The importance of maintaining clean data, ensuring seamless interoperability, and fostering clinician trust cannot be overstated. These elements are essential for achieving the full benefits of enterprise imaging, including improved diagnostic accuracy, enhanced patient outcomes, and streamlined operational efficiencies. By continuing to explore and adopt innovative solutions, healthcare organizations can look forward to a future where imaging data is seamlessly integrated, readily accessible, and leveraged to its fullest potential for the benefit of patients and clinicians alike.

For those interested in delving deeper into the world of enterprise imaging, several resources are available. Academic journals and conferences on medical informatics and healthcare IT provide a wealth of research and case studies on the subject. Organizations such as the Healthcare Information and Management Systems Society (HIMSS) and the Society for Imaging Informatics in Medicine (SIIM) offer extensive resources, including whitepapers, webinars, and professional networks. Additionally, engaging with vendors and solution providers like Merge by Merative can provide practical insights and demonstrations of cutting-edge technologies in enterprise imaging.

About Merge

Merge medical imaging solutions, offered by Merative, combine intelligent, scalable imaging workflow tools with deep and broad expertise to help healthcare organizations improve their confidence in patient outcomes and optimize care delivery.

Learn more at merative.com/merge-imaging

About Merative

Merative provides data, analytics, and software for healthcare and government social services. With focused innovation and deep expertise, Merative works with providers, employers, health plans, governments, and life sciences companies to drive real progress. Merative helps clients orient information and insights around the people they serve to improve decision-making and performance.

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Sources:

1. https://gkc.himss.org/resources/interoperability-healthcare

Produced in the United States of America
November 2024

SM-1598 Rev 1.0