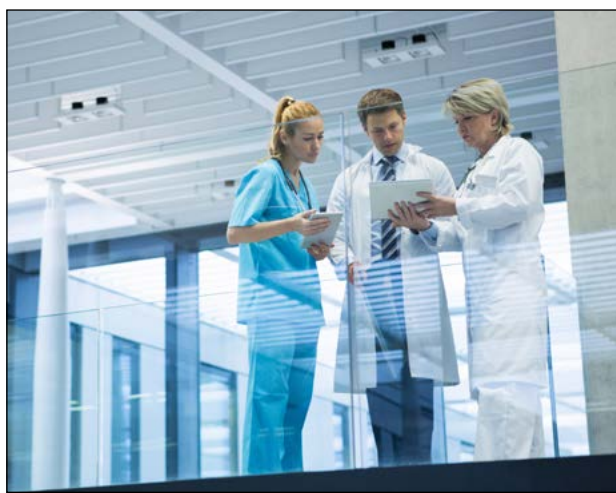


# Enterprise Imaging

## Driving Lower Total Cost of Ownership (TCO) for Healthcare Provider Organisations

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### Introduction

Healthcare provider IT systems today are growing, both in terms of complexity and scale. Most include a patchwork of hundreds of applications, connected with custom point-to-point application programming interfaces (APIs). This creates substantial redundancy of IT resources and personnel. Managing these complex networks is also highly challenging, especially in terms of network security and maintenance, opening the health provider to potential cyber threats. Healthcare provision today also demands greater information exchange between care providers, payers, public bodies and patients. Yet the flow of data and information is hindered by proprietary software applications or poorly structured data siloes.

This paper will focus specifically on IT redundancies that plague imaging informatics today. Specific examples are provided on problems faced by healthcare provider IT teams and their impact on Total Cost of Ownership (TCO). It also explores how a robust enterprise imaging strategy can reduce IT redundancy and offer operational and potential care outcome improvements. Advice is also provided on the important features and capabilities of vendor partners when assessing partners to support roll-out of an enterprise imaging strategy.



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### Imaging Informatics in Context

Radiology has been ahead of the curve in digitalisation. However, many of the more traditional software applications deployed over the last decade are increasingly problematic in the context of healthcare today. As health systems have increased in size and become more connected, multiple legacy PACS, viewers, bolt-on analytics and data archives from variety of vendors are being networked together. This has created many challenges for IT managers and clinical leaders, with the most common including:

- Centralising governance and access to all imaging and clinical media
- Update, maintenance and security of thousands of clinical applications
- Integration with the EHR viewer; enabling access to images through the EHR
- Managing imaging referrals process and image exchange with third party organisations
- Deployment of analytics and operational business intelligence to offer holistic view of performance, assets and resources across the enterprise
- Consolidation of procurement and supply chain

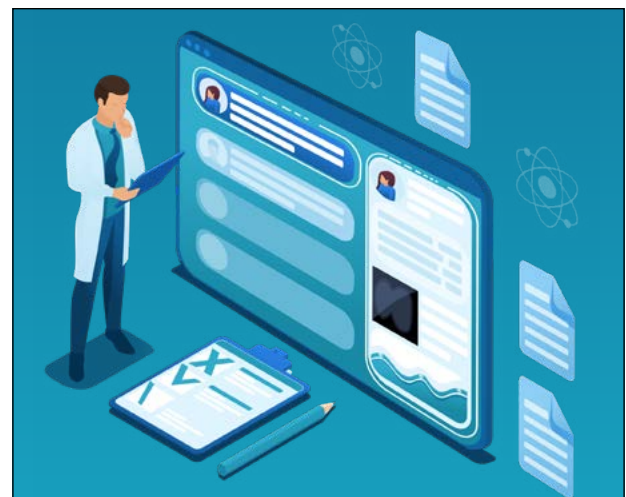
Redundancy across the system is also not well measured or understood; unnecessary cost, security risk and the time-intensive demands on IT

personnel are all increased due to the complexity of networks today. Few healthcare providers however have a plan or strategy to counter the problem, let alone be able to actively drive return on their investment (ROI) long term.

### What is Enterprise Imaging?

The growing use of medical imaging outside of radiology (such as in cardiology, breast, orthopaedics, pathology, oncology, surgery and emergency medicine) has further added complexity to the challenges outlined above. Imaging is no longer just performed in the radiological department. Therefore, the traditional radiology-focused approach to informatics has its limitations. Consequently, healthcare providers and vendors are focusing on a new concept for imaging informatics: Enterprise Imaging. It has been touted as opportunity to solve many of these challenges, yet it remains poorly understood.

The best consensus definition so far is offered from a partnership between two leading health informatics associations and can be seen below:



*Enterprise imaging 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 analyse all clinical imaging and multimedia content to enhance the EHR.*

**Source:** joint definition from; Healthcare Information and Management Systems Society (HIMSS) and Society for Imaging Informatics in Medicine (SIIM)



For health providers, it is difficult to translate this definition against the product portfolios of vendors offering imaging informatics solutions. Essentially, the above definition reflects that enterprise imaging is a strategy to achieve three main goals:

- Consolidate all imaging data and associated content from multiple clinical departments into a central platform
- Integrate with and enable a single point of access to imaging informatics data from the EHR
- Optimize resource utilization by providing intelligent workload allocation and care team collaboration tools

The above clearly outlines the main aim for enterprise imaging, but it also lacks clarity over some fundamentals of how to achieve the aim of consolidated and integrated imaging IT. These fundamentals include:

- Standards-based and structured data management
- Vendor and data agnosticism; avoiding “lock-in” with proprietary data storage formats
- The quantity of applications required to realize a comprehensive EI strategy (fewer is better)
- Support centralised security compliance and cross-enterprise maintenance and updates

Slow product evolution and the misconception of products available on the market today has also added confusion. Many products available today offer “enterprise imaging”, yet few stand up to the fundamentals outlined above, failing to meet or only partially supporting a robust enterprise imaging strategy.

For example, extension of more traditional proprietary PACS systems or addition of vendor neutral archives (VNAs) or universal viewers is commonly described as enterprise imaging. Yet these approaches are not capable of supporting the full seamless interoperability or data management required; most will require extensive APIs, multiple viewers and additional modules. Many also operate on a “rip and replace” model, thereby leading to substantial migration and upgrade costs. Moreover, these solutions will substantially add to TCO for healthcare providers and create IT more IT redundancy challenges.

However, there are some mature imaging IT solutions on the market today that can support a long-term enterprise imaging strategy. This provides a clear opportunity for healthcare providers to dramatically reduce the impact of imaging on overall IT resources and costs, while also supporting potential improvements in patient care quality and improved physician user experience.



## Total Cost of Ownership for Imaging IT

Before committing to a solution, healthcare providers should first consider their existing system and understand the current total cost of ownership, before assessing the potential impact of an enterprise imaging strategy.

IT managers are often aware of system redundancy at some level, but few realise the true long-term cost of managing legacy clinical systems across their enterprise. Siloed data, customised integrations and duplication of effort managing multiple PACS and other imaging IT sub-systems can have pronounced impact on IT resources, especially for user education.





















This fragmented approach will become exponentially more costly over time; care model evolution and its requirement for cross-enterprise imaging data availability, combined with new clinical areas digitalising will add increased complexity. Future IT resources will therefore be over-stretched in supporting this new era unless a rigorous long-term strategy is implemented.

Total Cost of Ownership should be the basis of understanding current cost of existing network

and identifying areas of redundancy ahead of any purchasing decision. While this can be challenging in larger enterprise networks operating many disparate legacy imaging IT systems and applications, failure to do so will result in significant future IT cost implications.

An enterprise imaging strategy should be focused on significant reduction in IT costs and resource redundancy while allowing scalability and expansion to more service lines. Moreover, it offers substantial opportunity for clinical resource savings too.

Below we have provided a few examples of redundancy often overlooked by health providers. Each aspect has measurable costs to the organisation from an IT perspective, not to mention wider administration, operational and clinical impacts. The examples are based on a mid-size, multi-site, healthcare provider operating multiple legacy imaging IT systems from different vendors (e.g. PACS, RIS, Cardiology PACS, CVIS, Image Exchange, numerous Clinical Viewers etc.) each with its own back-end system, disaster recovery and patching. These 5 examples are explained fully over the next 3 pages.

EXAMPLE	IT RESOURCES	CLINICAL RESOURCES	ADMINISTRATION RESOURCES
 <b>1. SECURITY &amp; UPGRADES</b>			
 <b>2. ENCOUNTER-BASED IMAGING</b>			
 <b>3. PROCUREMENT</b>			
 <b>4. DATA GOVERNANCE AND ACCESSIBILITY</b>			
 <b>5. DATA AVAILABILITY AND MIGRATION</b>			

**KEY:**  Moderate cost  Significant cost  Major costs

## Examples of Total Cost of Ownership for Imaging IT

### EXAMPLE 1: SECURITY AND UPGRADE MANAGEMENT



- Security for hundreds of legacy clinical applications IT resource intensive
- Legacy applications (clinical device management, custom interfaces or workflow tools, specialist image analysis tools) – poorly managed or unsupported operating systems massively increases risk of major cybersecurity event
- Upgrade compliance and interfacing between multiple imaging systems from multiple vendors – IT resource intensive
- New upgrades in multiple imaging systems running concurrently in different sites – feature or upgrade redundancy or duplication

#### HOW AN ENTERPRISE IMAGING STRATEGY CAN HELP:

Consolidation and centralisation of core imaging services into a singular platform can simplify security and update management, while dramatically reducing security risk. Moreover, tracking of updates, implementation planning, and user training is all centrally managed and more predictable for IT and clinical users.

Legacy application retirement and integration into central imaging IT platform can further reduce IT maintenance and support and reduce number of API interfacing requests.

### EXAMPLE 2: ENCOUNTER-BASED IMAGING SUPPORT



Patients are increasingly being imaged outside of the conventional radiology department; many of these clinical settings such as dermatology and emergency medicine have no order-based workflow available. This can lead to:

- Manual post-scan order entry and/or patient history update (physician or technician)
- Additional custom API and EHR build required for each clinical dept. – IT resources
- Generic image description and multiple instances of same image – additional IT cost
- Poor or lack of image annotation; lack of searchable patient history and image access from disparate PACS systems – clinical or physician time; patient care
- Missed billing and reimbursement; more complex billing and reimbursement audit
- Testing, training, security, maintenance of multiple standalone custom workflows – IT resource, time and compliance risk
- Significant cybersecurity risk

#### HOW AN ENTERPRISE IMAGING STRATEGY CAN HELP:

Mature enterprise imaging IT solutions can offer a centralised, standards-based approach to managing non-traditional, encounter-based imaging at the point of care. With one centralised system, integration with EMR is simpler, user training load is reduced and demand on IT resources significantly reduced. Advanced data management tools embedded in mature offerings can automate context-based annotation and metadata creation, remove duplicates and ensure image access paired to relevant clinical content. Moreover, radiologist access to POCUS images from other departments can highlight POCUS training issues and drive broader cross-departmental clinical training and guidance.

*Continued on next page*

**EXAMPLE 3: PROCUREMENT**

Health providers with software and maintenance contracts from multiple vendors struggle to keep track of these complex agreements, often leading to unforeseen costs and redundancies. The biggest challenges in managing IT supply chain include:

- Software licensing management, especially with varying contract types and business models from different supplier vendors
- Administration resources to manage, negotiate, audit and renew multiple contracts across the health provider network
- Less predictability for future IT budgeting
- Unforeseen technical and IT resource costs for integration and migrations
- Limited confidence or understanding of long-term strategy or R&D pipeline of vendors

**HOW AN ENTERPRISE IMAGING STRATEGY CAN HELP:**

An enterprise imaging strategy commonly focuses on reducing the number of vendors in a supply chain, contracting with just a few core partners to provide the imaging IT platform across all sites and clinical departments in the network. Consolidating in this way dramatically reduces the uncertainty and complexity of imaging IT software contracting. Additionally, many central vendor partners can further reduce contract complexity by integrating third-party software into their platform and bundling contracts into a central master agreement, essentially acting as a broker for best-of breed or specifically required software tools. This longer-term central partnership approach can make future costs more predictable and create the basis for operational contracting.

**EXAMPLE 4: DATA GOVERNANCE AND ACCESSIBILITY**

The average mid-size health system in the USA has over 60 imaging applications across a multitude of clinical departments. Central governance is thereby made nearly impossible due to:

- Proprietary data siloes requiring manual or customised data routing
- Duplicate or manual data entry, wasting technician, physician and IT resources
- Incomplete or fragmented patient records; time intensive image access and collation
- Incompatible clinical or diagnostic viewing software
- Lack of harmonised data output from disparate applications, preventing enterprise-wide audit, analytics and business intelligence use

**HOW AN ENTERPRISE IMAGING STRATEGY CAN HELP:**

Centrally managing most imaging applications via a single IT platform creates a clear reduction in total cost of ownership for health providers. Most mature imaging IT platforms designed for enterprise use can automate many time-consuming data governance processes. Additionally, centralised data management enables greater insight into the operational and technical management of the system, improving system performance monitoring, resource management and data quality audit.

*Continued on next page*

**EXAMPLE 5: DATA MIGRATION**

Most health providers using traditional PACS typically require data migration with new software deployment every four to six years, at substantial cost. Managing multiple PACS or imaging IT system migrations across an enterprise has major implications, including:

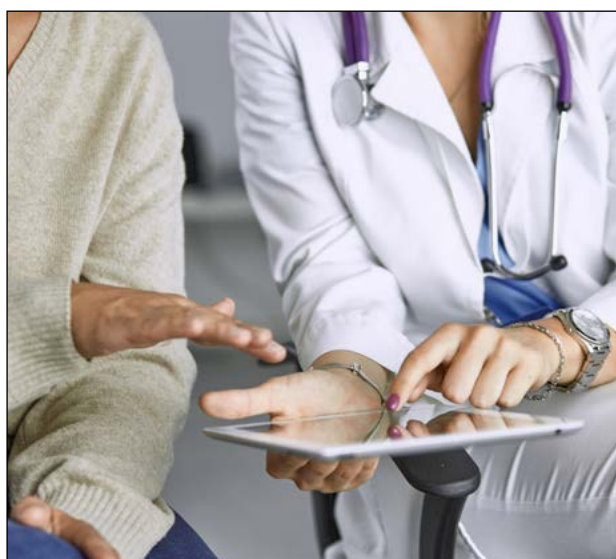
- Timely and expensive conversion, migration and project management costs, only to rinse and repeat in mid-term
- Redundant storage costs where legacy data must be accessed from multiple systems
- Unforeseen time delays, system downtime and surprise costs
- Uses up significant time for IT personnel, limiting their ability to contribute to more valuable projects focused on improving care outcomes or operational efficiency

**HOW AN ENTERPRISE IMAGING STRATEGY CAN HELP:**

The foundation of all enterprise imaging strategies is a robust central data management and workflow platform, usually based on a vendor neutral archive (VNA). Consolidation of all imaging and associated clinical content into a single standards-based registry and repository can reduce or even eliminate the need for future data migrations. Where migrations are required, vendors should offer a flexible solution that can allow “image-first” migrations, thereby limiting disruption to diagnostic access. Centralising imaging data across the enterprise can be better managed (e.g. information lifecycle management), accessed and audited. A common data management layer also creates the basis for cloud-based deployment.

**What to Look for in a Vendor Partner**

As has been outlined above, total cost of ownership (TCO) is an important measurement for healthcare providers to understand the economic and operational impact of their imaging IT solutions. Such analysis will usually point to the need for a more consolidated strategy for



imaging IT, especially considering the increasingly complexity and reach of imaging within healthcare organisations.

When assessing potential vendor solutions, IT administrators should particularly focus on imaging IT platforms with mature features and capabilities that can support the convergence of disparate and legacy application imaging IT systems and reduce cost and resource redundancy. Each healthcare provider should therefore define expected priority outcomes and assess vendor suitability.

As there is no clear definition on what constitutes a “platform”, health providers should also closely scrutinize the number of databases and applications required to fulfil an enterprise imaging strategy. A higher number of databases/applications will generally parlay higher cost and complexity to deploy and manage the solution, thus leading to a higher failure risk and higher TCO.

Above all, healthcare providers should focus on vendors that can offer the broad competencies listed on the following page.



## HEALTHCARE PROVIDERS SHOULD FOCUS ON VENDORS THAT CAN OFFER THESE 4 BROAD COMPETENCIES

1

### OFFER ROBUST, MATURE, FLEXIBLE AND CONSOLIDATED IMAGING IT PLATFORM

- Complete imaging data for clinicians while driving cost reduction
- Modular and scalable platform to handle current and future multi-disciplinary needs
- Comprehensive exchange and routing of imaging and associated content within network and with broader provider network (third parties)
- Leverage rich-data sources to support development and use of AI/ML

2

### DRIVE CUSTOMER ROI AND REDUCTION IN TCO

- Reduction in IT resources (headcount skillset and infrastructure) to provide access, management, exchange and storage to multiple service lines
- Simplified system monitoring, audit and security
- Reduced training and deployment resources required
- De-risk organisational security and external cyberattack threat

3

### PROVIDE BASIS FOR LONG-TERM PARTNERSHIP

- Vendor partner can trust and will support in process of long-term change management and enterprise imaging strategy roll-out
- Clear ongoing R&D pipeline and transparent upgrade schedule
- Long-term support and guidance to drive ongoing improvement in TCO reduction
- Commitment to proven rigorous standards

4

### ENABLE OPERATIONAL AND CLINICAL OUTCOME IMPROVEMENT

- Proven standards-based technology that supports long-term care and operational improvement
- Improved business analytics and operational intelligence
- Enable multidisciplinary clinical collaboration; better care outcomes and improved patient care
- AI/ML data access and use; standardising and organising data; renders data more useful for use later



## Conclusion

Despite its relative digital maturity, medical imaging today creates many challenges from an informatics perspective. Many healthcare providers today operate with substantial IT redundancy, stretching budgets and resources to handle maintenance, upgrades, security and integration across a multitude of applications. As healthcare networks grow and health systems consolidate, cost will continue to increase and pressure on the IT resources will only intensify.

A robust enterprise imaging strategy can counter these challenges. However, successful implementation is not just about consolidating data storage, or centralising procurement, it should drive a significant reduction in TCO for the health provider by eliminating IT redundancy, reducing security risk and freeing up IT personnel to focus on projects that actively improve operational and clinical outcomes. Inherently this

will also drive clinical value for health providers, offering consistent clinical user experience (UX), opportunity for multidisciplinary collaboration, data liquidity between physicians and a rich contextual longitudinal patient history.

While there are many products on the market today, many fall short of enabling such a transformation. Therefore, healthcare providers should be looking for vendors that can offer a long-term partnership and deliver a robust, standards-based and flexible imaging IT platform.

Further, successful enterprise imaging adoption should have a profound impact on the broader delivery and quality of patient care, enabling improvements in workflow and application interoperability, offering network-wide secure clinical access and providing a foundation for analytics and business intelligence tools at scale.

## About the author



Steve has more than a decade of experience in healthcare technology market intelligence. He has served as Senior Analyst at InMedica (part of IMS Research) and Associate Director for IHS Inc.'s Healthcare

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His areas of expertise include imaging informatics, clinical IT software, medical imaging hardware and broader digital precision

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